“A PROSPECTIVE STUDY TO EVALUATE THE INCIDENCE OF DIFFICULT ENDOTRACHEAL INTUBATION IN THYROID SURGERY”

Dissertation submitted to

THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY

In partial fulfilment for the award of degree of

DOCTOR OF MEDICINE

IN

ANAESTHESIOLOGY

BRANCH X

INSTITUTE OF ANAESTHESIOLOGY AND CRITICAL CARE

MADRAS MEDICAL COLLEGE

CHENNAI -600 003.

CERTIFICATE

This is to certify that that the dissertation entitled, "**A PROSPECTIVE STUDY TO EVALUATE THE INCIDENCE OF DIFFICULT ENDOTRACHEAL INTUBATION IN THYROID SURGERY"** submitted by **DR.ARTHI G** in partial fulfilment for the award of degree of doctor of medicine in Anaesthesiology by the Tamilnadu Dr.M.G.R. Medical university, Chennai., is a bonafide record of the work done by her in the INSTITUTE OF ANAESTHESIOLOGY AND CRITICAL CARE, Madras Medical college and government hospital, during the academic year 2015 to 2018.

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DECLARATION

I here by ,declare this disseratation entitled "**A PROSPECTIVE STUDY TO EVALUATE THE INCIDENCE OF DIFFICULT ENDOTRACHEAL INTUBATION IN THYROID SURGERY,"** is a bonafide record of the work done by me in the INSTITUTE OF ANAESTHESIOLOGY AND CRITICAL CARE, MADRAS MEDICAL COLLEGE, during the academic year 2015 to 2018 under the guidance of **DR. SAMUEL PRABHAKAR,** M.D, professor of Anaesthesiology, Madras medical college, Chennai and submitted to Tamilnadu Dr.M.G.R. Medical university, Chennai, Guindy, Chennai., in partial fulfilment for the award of degree of M.D. Anaesthesiology, examinations to be held on April 18.

I have not submitted this dissertation previously to any university for the award of degree or diploma.

Place –Chennai **DR. ARTHI G**

Date -

ACKNOWLEDGEMENT

I am extremely thankful to **DR.NARAYANA BABU DEAN, Madras Medical College** and Rajiv Gandhi Govt. Hospital, for his permission to carry out this study in INSTITUTE OF CHILD HEALTH.

I am extremely thankful to Prof.DR. Anuradha Swaminathan Director, Institute of Anaesthesiology and critical care ,for her concern and support to conduct this study.

I am extremely thankful to my guide Asst. Prof. **DR. SUGANTHA LAKSHMI** M.D ,D.A, Assistant professor of anaesthesiology ,Madras medical college ,Chennai, for her expert guidance ,valuable support and constant encouragement in preparing this dissertation .

I am sincerely thankful to my assistant professors **DR.GANESH, DR.ASHA, DR.RUKESH, for their** excellent guidance and advice to carry out this study..

I also extends my sincere thanks to the institutional ethical committee for their guidance and approval for my study.

My sincere thanks to the statistician, who played an important role during my study and I am thankful to my family and friends for their moral support ,help and advice in carrying out my dissertation .

I thank all my patients for willingly submitting themselves for my study. Above all I pay my gratitude to the lord Almighty for blessing me to complete this work..

TABLE OF CONTENTS

INTRODUCTION

The purpose of undertaking airway assessment is to diagnose the Potential for difficult airway for:

a. Optimal patient preparation,
b. Proper selection of equipment and technique and
c. Participation of personnel experienced in the difficult airway management

This usually leads to a successful airway management. On the other hand, determining that the airway is normal, avoids time consuming, invasive, and potentially more traumatic methods of securing the airway, from being adopted.

The essential components of airway assessment are history taking, general examination of the patient and specific tests/indices to predict difficult airway.

Previous anaesthesia records may reveal a documented history of difficult airway. History of previous surgery, burns, trauma or tumour in and around the oral cavity, neck or cervical spine should be asked.

A general examination of the patient should include recognition of anatomic factors that cause difficult laryngoscopy and intubation. This requires a disciplined, complete examination. The anaesthesiologist must understand and identify pathologic and physiological factors that may impair laryngoscopy and intubation.

Difficult airway is defined as the clinical situation in which a conventionally trained anaesthesiologists experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation or both.

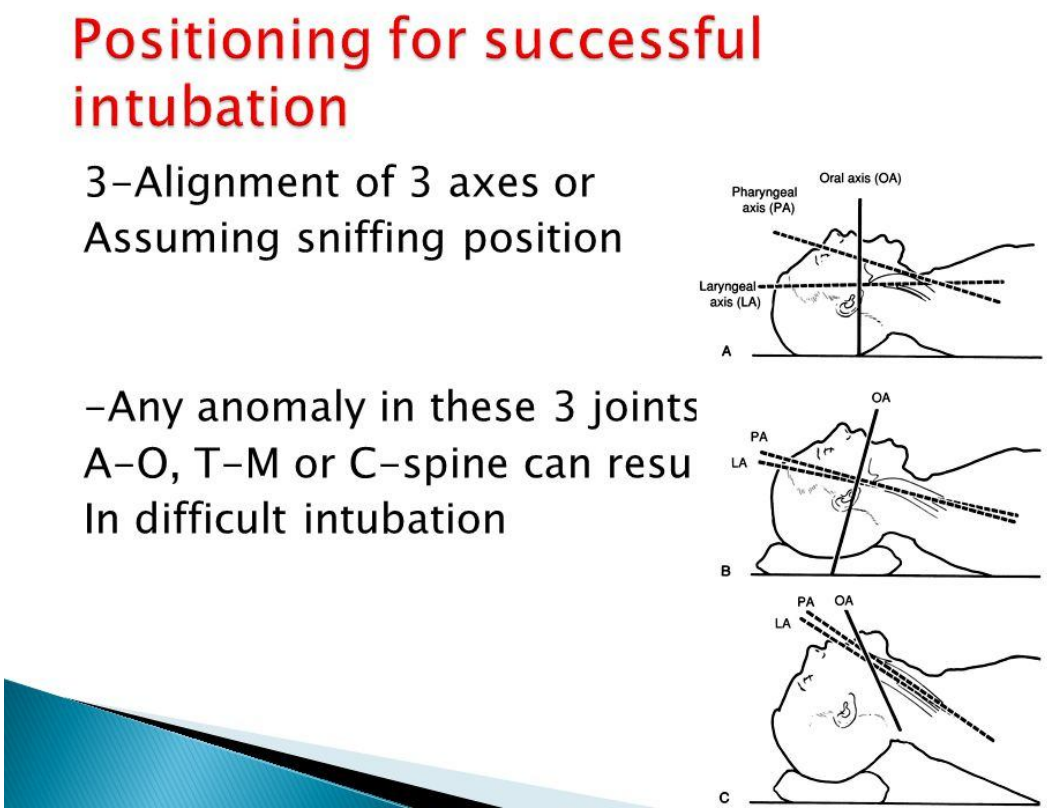
The ASA task force defined difficult mask ventilation as occurring when it is not possible for the unassisted anaesthesiologist to maintain oxygen saturation more than 90% using 100% oxygen and positive pressure mask ventilation in a patient whose oxygen saturation was more than 90% before anaesthetic intervention; and/or, it is not possible for the unassisted anaesthesiologist to prevent or reverse signs of inadequate ventilation during positive pressure mask ventilation

Difficult laryngoscopy is when it is not possible to visualize any portion of the vocal cords after multiple attempts at conventional laryngoscopy. This usually corresponds to Cormack and Lehane's grade IV laryngoscopic view.

Difficult tracheal intubation is when tracheal intubation requires multiple attempts, in the presence or absence of tracheal pathology.

Visualization of glottis is essential for successful endotracheal intubation. This can be achieved with direct laryngoscopy when the patient is placed in sniffing position (slight flexion (35*) of neck on chest and extension(80*) of head on neck), so that oral, pharyngeal and

laryngeal axis get aligned with the laryngoscopists's eyesight.



Thyroid swelling has been considered a risk factor for difficult direct laryngoscopy and intubation. Thus detecting difficulty in maintaining airway or difficulty in intubation during induction pre Operatively becomes essential. Difficult endotracheal intubation can also be stated as inadequate exposure of glottis during direct laryngoscopy. Thyroid swelling is associated with hyperthyroidism or hypothyroidism

leading to endocrine disturbances and metabolic effects which is an additional risk factor for endotracheal intubation .

Difficulty in airway control may be supraglottic, glottic (ie) at the level of vocal cord or infraglottic (ie) at the level of trachea. Supraglottic factors include mouth opening, tongue size, pharynx, submandibular space, head and neck mobility, neck circumference and obesity

Direct laryngoscopy may be difficult in mallampatti grades 3 or 4, restricted mouth opening (< 20 mm),reduced thyromental Distance (<6cm),reduced Wilson angle of neck movement (< 80*), Obesity (increased Bmi), increased neck circumference (> 50 cm).Indirect laryngoscopy is used to measure vocal cord movement(glottis airway factors). Infraglottic factors are tracheal deviation and compression. Transient recurrent laryngeal nerve palsy must also be taken into consideration.

Airway management in thyroid swelling patients poses Unique challenges and one should be thoroughly prepared for any Anticipated or unpredicted difficult airway. Airway management in general population has been widely studied. But very few studies have been done on airway management in thyroid swelling patients. Thus it will be useful to find the incidence of difficult endotracheal intubation in thyroid surgeries .

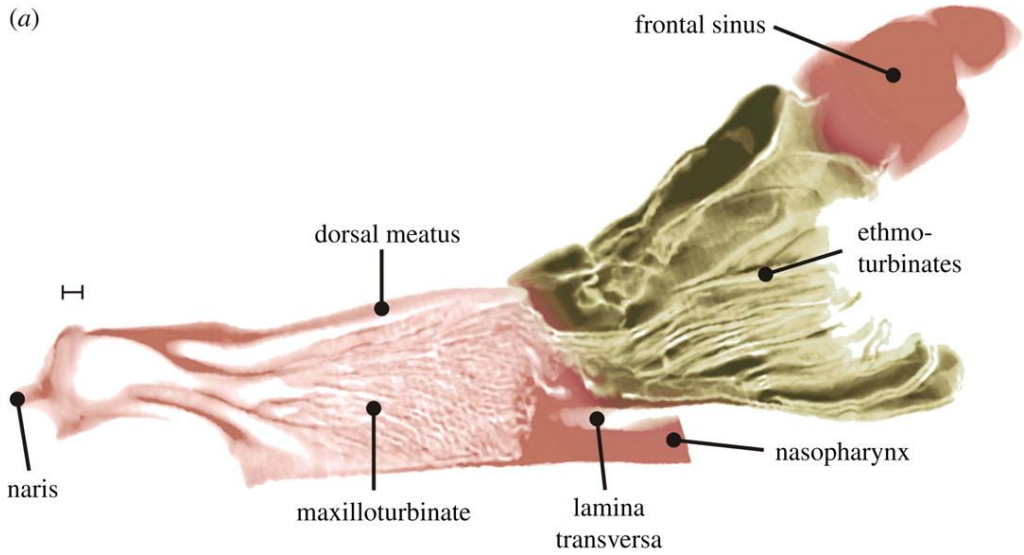
AIM OF THE STUDY

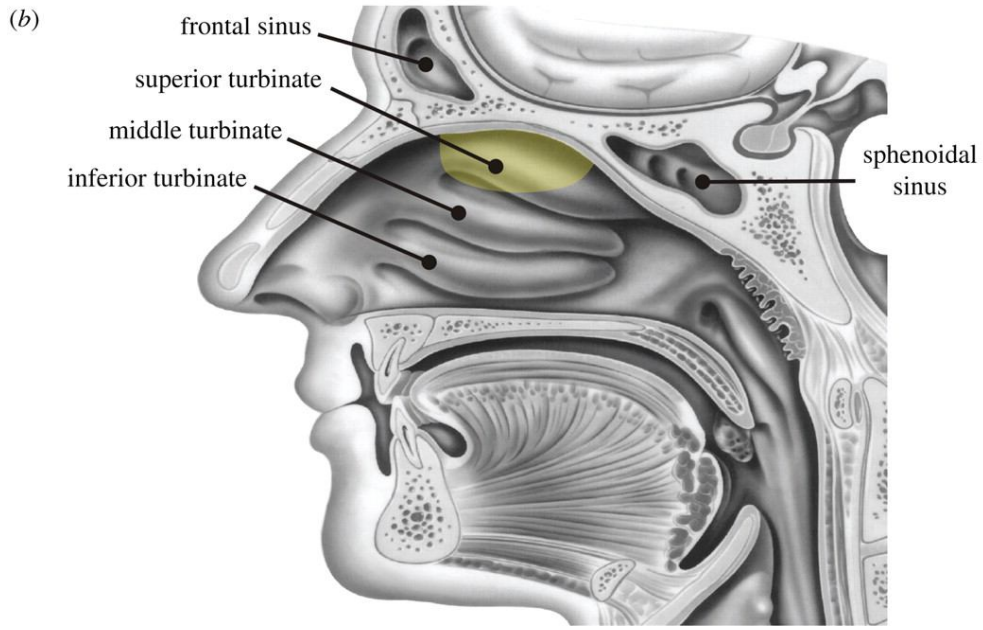
A prospective study to evaluate the incidence of difficult endotracheal intubation in thyroid surgery.

AIRWAY ANATOMY

The pathway through which atmospheric air reaches the alveoli is termed the airway. It includes the nose, nasopharynx, oropharynx, larynx , trachea, various divisions of bronchi and alveoli

Of these nose, pharynx and part of larynx upto glottis constitute the upper airway. The part below the glottis constitutes the lower airway.





Human nose consists of two nasal fossae,separated by a nasal septum.The nasal fossae extend from nostrils to nasopharynx and roughly measures 10 to 14 cm in average sized adult.The lateral walls of fossae consists of three conchae, formed by three turbinate bones namely,superior, middle and inferior turbinates.

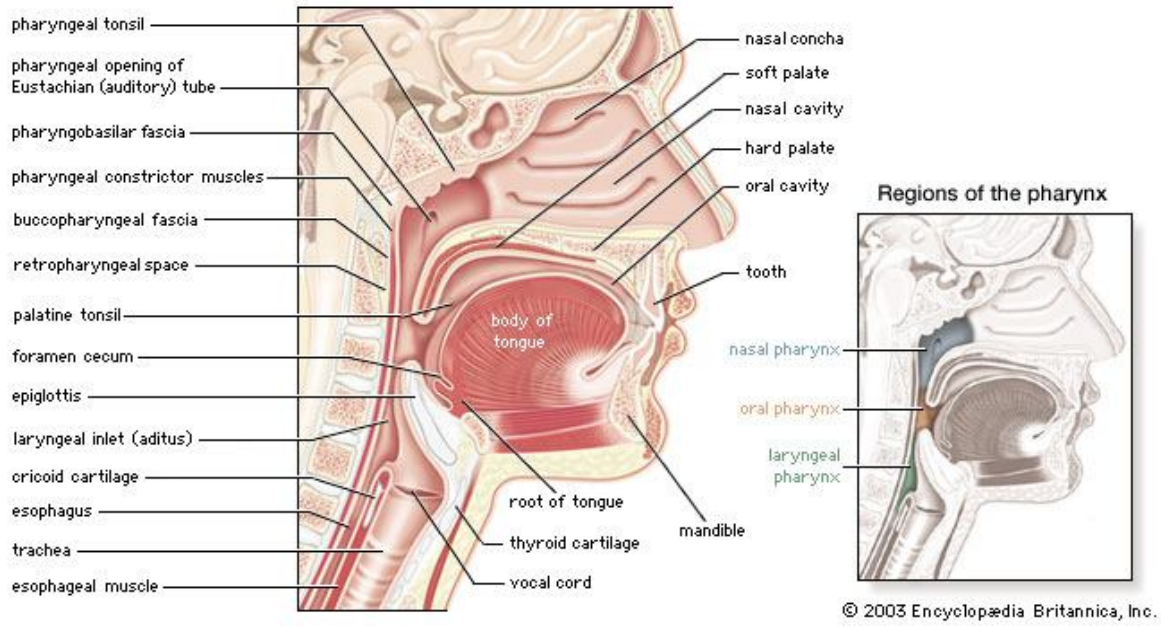
The spaces between the turbinates are called meatuses.The paranasal sinuses ,which are hollow cavities in facial bones, open into the nasal fossae,through their respective ostia .

The roof of the nose is formed by cribriform plate of ethmoid bone.This plate has many perforations, through which olfactory nerve project into nose.

.Nose is supplied by branches of olfactory and maxillary arteries and by branches of olfactory and maxillary divisions of trigeminal nerve. These branches are needed to be blocked before awke intubation techniques, either fibreoptic bronchoscope guided or blind nasotracheal or retrograde intubation.

Damage to turbinates is common complication of nasotracheal intubation and size of inferior turbinate decides the size of endotracheal tube that can be passed nasotracheally.

PHARYNX:



ANATOMY OF PHARYNX

Pharynx is a musculomembranous tube extending from skull base to inferior border of cricoids cartilage.It roughly measures 12 to 14 cms in an average sized adult..It consists of three parts namely nasopharynx,oropharynx and laryngopharynx.

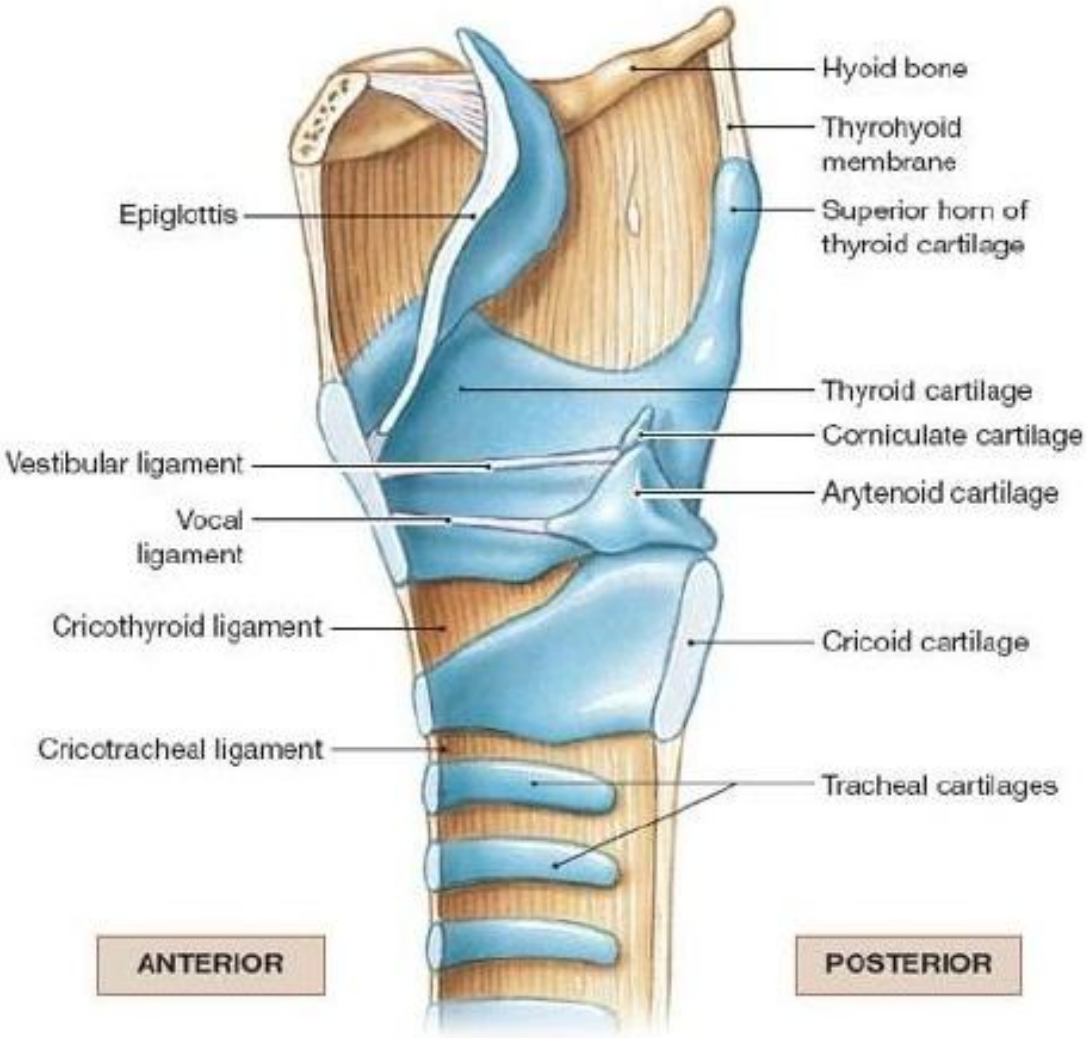
Pharynx consists of outer circular and inner longitudinal layers. Pharyngeal muscle tone decreases during sleep and it comtributes to sleep apnoea.

There are many lymphoid tissues present around oropharynx, namely, lingual tonsil, palatine tonsil, adenoid, retropharyngeal and parapharyngeal nodes. Enlargement of adenoid poses difficulty in

nasotracheal intubation. Enlargement of palatine and lingual tonsils pose difficulty in orotracheal intubation.

Abscess formation in retropharyngeal and parapharyngeal area lead to difficulties in airway management and the potential for rupture and spillage of abscess during intubation.

LARYNX



(d) Larynx, sagittal section

Larynx extends from third to sixth cervical vertebra. Its position is little cephalad in females and children. 9 cartilages, muscles, ligaments and joints constitute the larynx.

There are 3 paired and 3 unpaired cartilages. Arytenoids, cuneiform and corniculate are the paired cartilages. Thyroid, cricoid and epiglottis are the unpaired cartilages.

The membrane between thyroid and cricoids cartilages is termed the cricothyroid membrane, which forms an important landmark for translaryngeal block and emergency cricothyroidotomy.

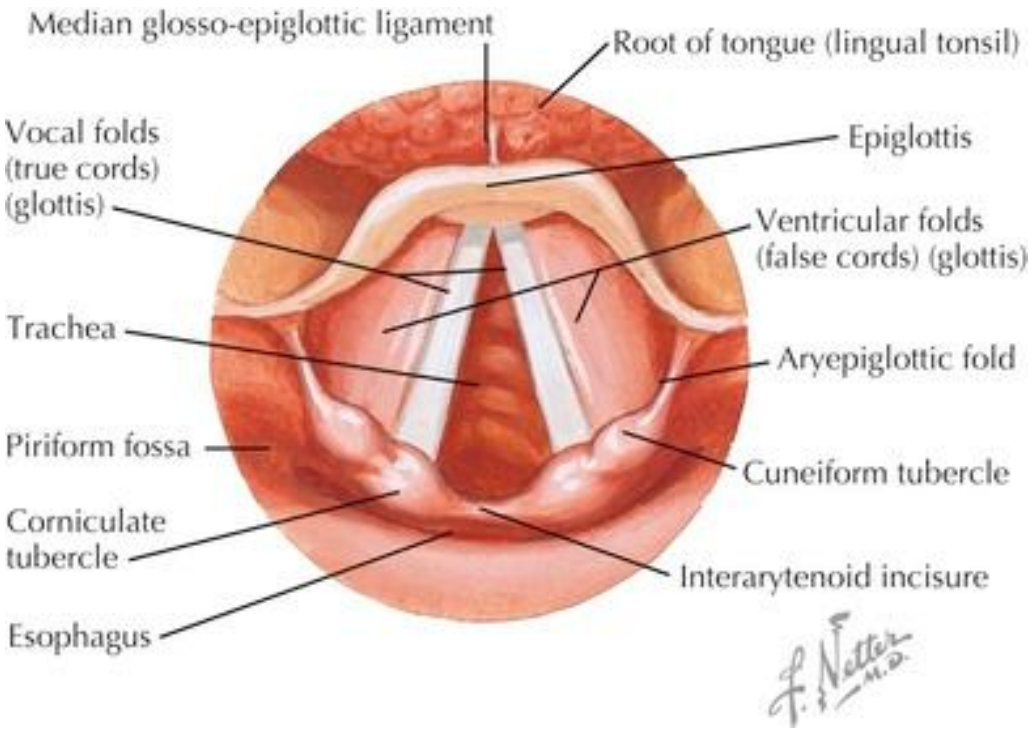
The membrane between thyroid cartilage and hyoid bone is called thyrohyoid membrane, which forms the landmark for superior laryngeal nerve block.

Cricoid is a ring shaped cartilage. Pressure on the cricoid cartilage compresses the oesophagus and prevents regurgitation of gastric contents into airways during intubation. This pressure is called sellick‘s maneuver.

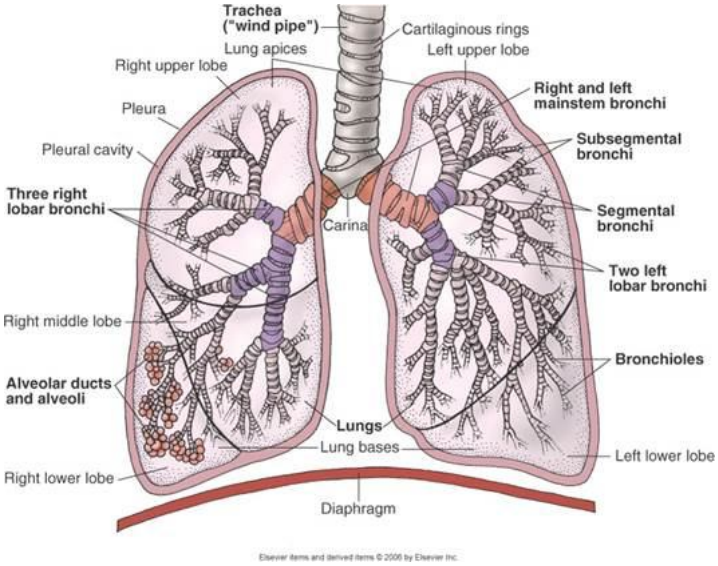
INNERVATION OF THE LARYNX

The larynx is supplied by superior laryngeal nerve above the vocal cords and by recurrent laryngeal nerve below the level of vocal cords. Because the recurrent laryngeal nerves supply all the intrinsic muscles of larynx (with the exception of cricothyroid), trauma to these nerves can result in vocal cord dysfunction. As a result of unilateral nerve injury, airway function is usually unimpaired, although the protective role of larynx in preventing aspiration may be compromised.

Larynx(viewed from above)



LOWER AIRWAY



TRACHEA

Trachea starts from lower border of cricoid cartilage. It measures roughly about 10 to 12 cm in length in adults. It contains 16 to 20 c – shaped cartilages. Trachea ends at carina by dividing into right and left main bronchus.

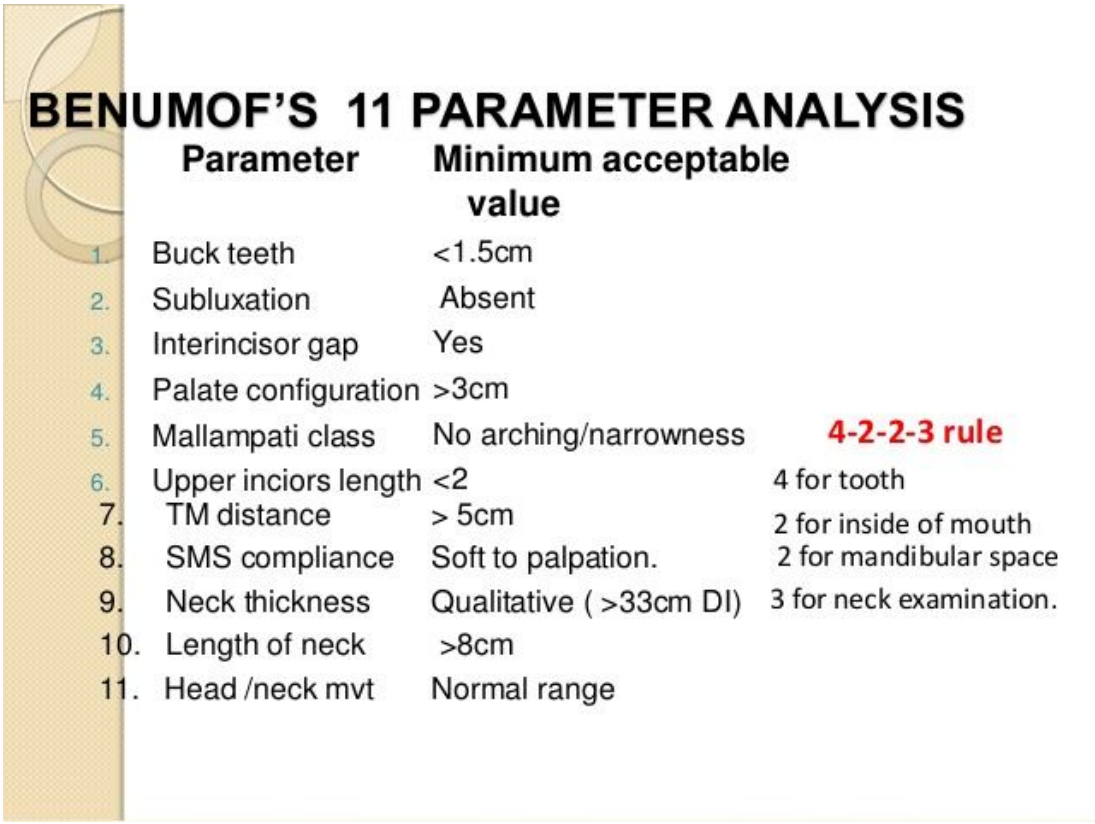
BRONCHI

Right main bronchus is steeper, shorter and wider than left main bronchus. So foreign bodies commonly enter the right lung. Endobronchial intubation is common in right main bronchus. Aspiration commonly occurs in right lower lobe in sitting patient.

Bronchi divide into 20 bronchopulmonary segments.(10 on each side). Bronchi divide into multiple divisions forming lobar bronchi , segmental bronchi, subsegmental bronchi, terminal bronchioles, respiratory bronchioles and alveolar ducts which ultimately lead to the alveoli.

AIRWAY ASSESSMENT

Airway assessment is essential in the preoperative period to plan for appropriate strategies for intubation. Following are few of the commonly assessed parameters.



MODIFIED MALLAMPATTI CLASSIFICATION

This conveys information about the adequate oropharyngeal space for laryngoscopy. Size of the tongue in relation to oropharynx is assessed by this index. Patients are seated with head in neutral position. Then they are asked to wide open their mouth and protrude their tongue as much as they can. Patients are instructed not to phonate during assessment. Oropharynx is visualized at the level of their mouth. According to structures visualised patients are sorted into 4 categories.

Class I: entire uvula, faucial pillars and soft palate could be visualized.

Class II: a portion of uvula, fauces and soft palate could be visualized.

Class III: base of uvula and soft palate could be visualized.

Class IV: only hard palate could be visualized.

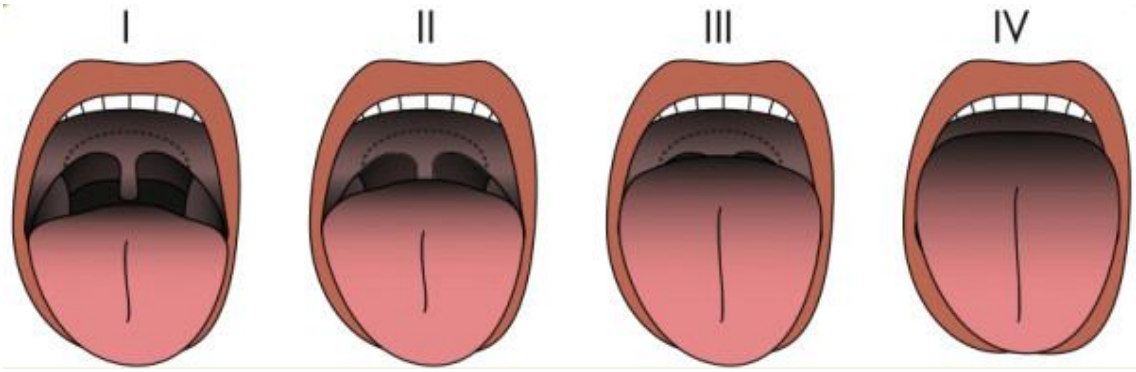


Fig.Modified mallampatti classification.(courtesy: Wikipedia)

INTER INCISOR DISTANCE (IID)

This is measured with a measuring tape with the patient in sitting position and mouth wide open. Distance between lower border of maxillary and upper border of mandibular incisors are measured. Normal value is more than 5cms/admits 3 fingers

THYROMENTAL DISTANCE (TMD)

This is measured with the patient in sitting position and neck fully extended. Vertical distance between mentum and thyroid notch is measured.

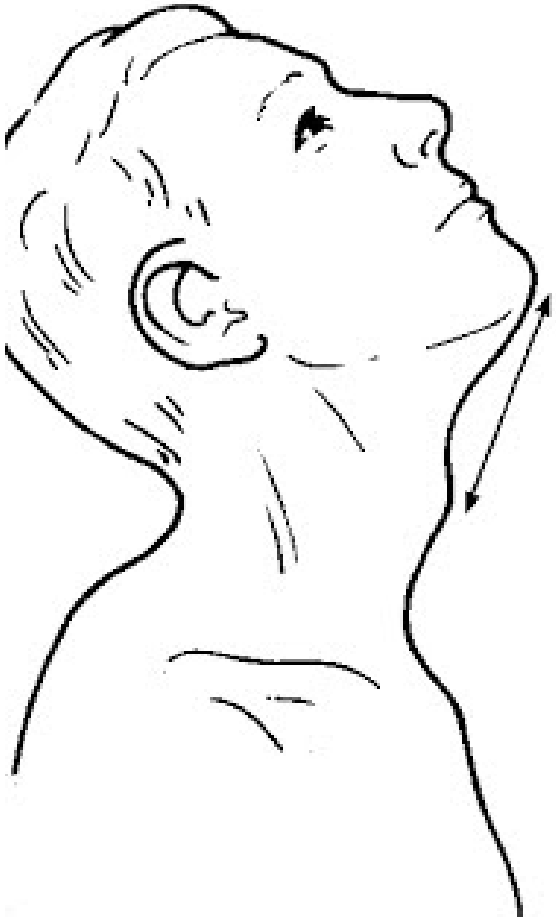
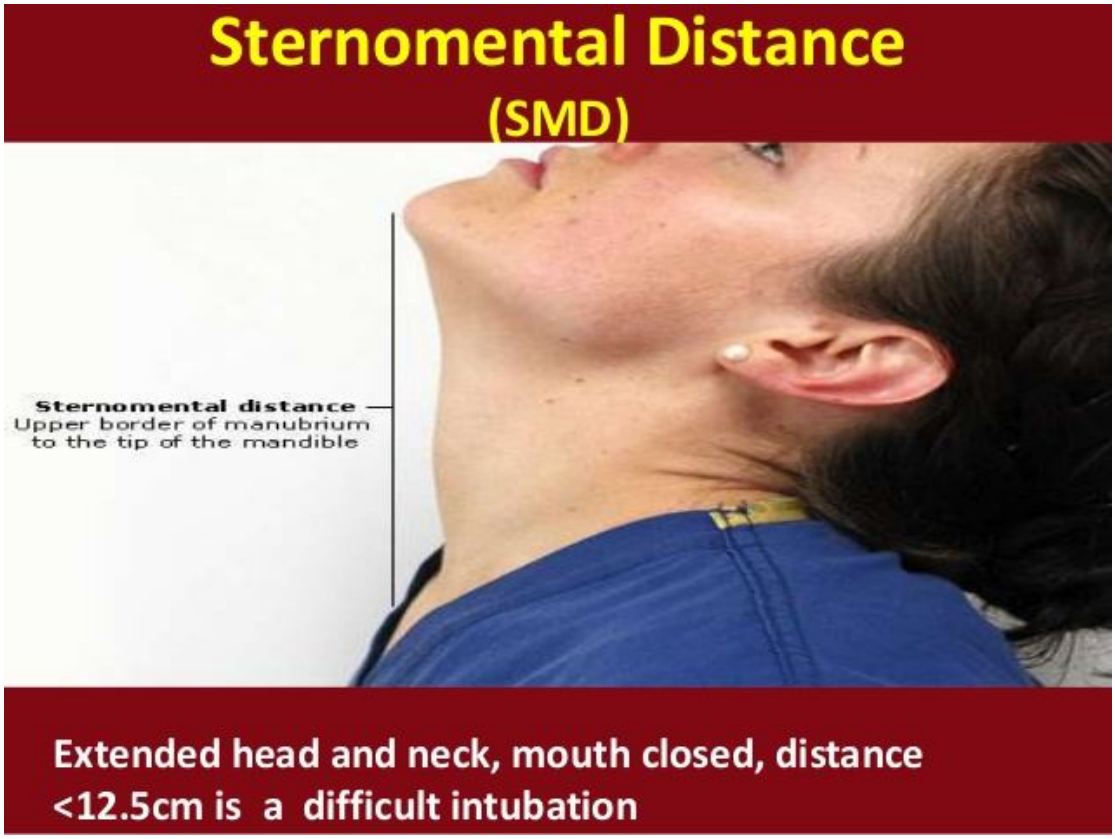


Fig .Measurement of thyromental distance.
(courtesy :plainwhitescrubs.blogspot.com)

STERNOMENTAL DISTANCE (SMD)

This is measured with the patient in sitting position and neck fully extended. Vertical distance between mentum and supra sterna notch is measured.



NECK CIRCUMFERENCE (NC)

This is measured with the patient in sitting position and head in neutral position. Neck circumference is measured at the level of thyroid notch.

Fig Neck circumference measured at the level of thyroid notch.
(courtesy: docseducation.com)

TEETH

Presence of any loose teeth, denture or buck teeth are to be noted, as they pose difficulties during laryngoscopy.

UPPER LIP BITE TEST (ULBT)

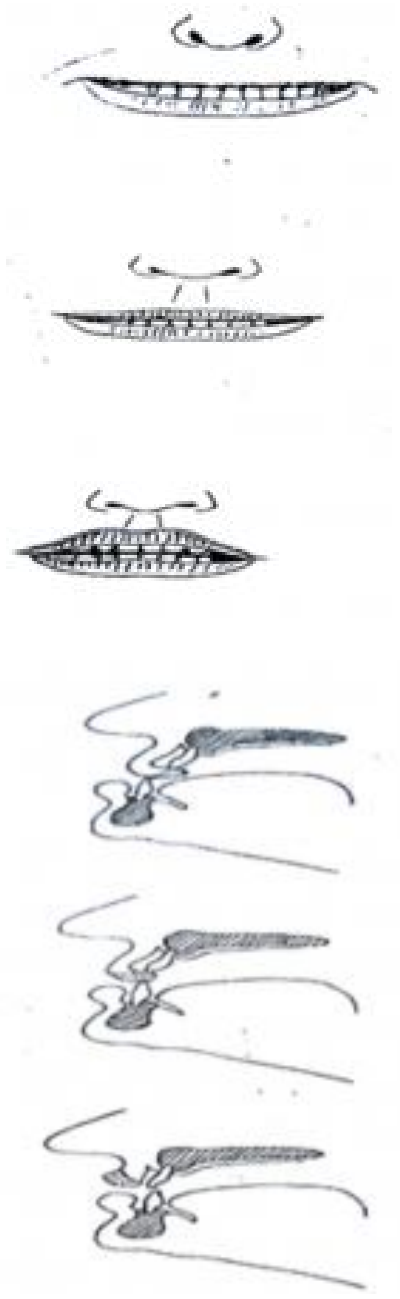


Fig .Upper lip bite Test

(Courtesy : Comparison of upper lip bite test and modified Mallampatti classification in predicting difficult intubation by Ravindra R. Bhat MD et al,The internet journal of Anaesthesiology.,ISSN:1092 – 406x)

This test assesses the mobility of temperomandibular joint, particularly the sliding movement. Patients are assessed in the sitting position. They are asked to bite their upper lip with their mandibular incisors and the extent to which mandible moves forward is noted.

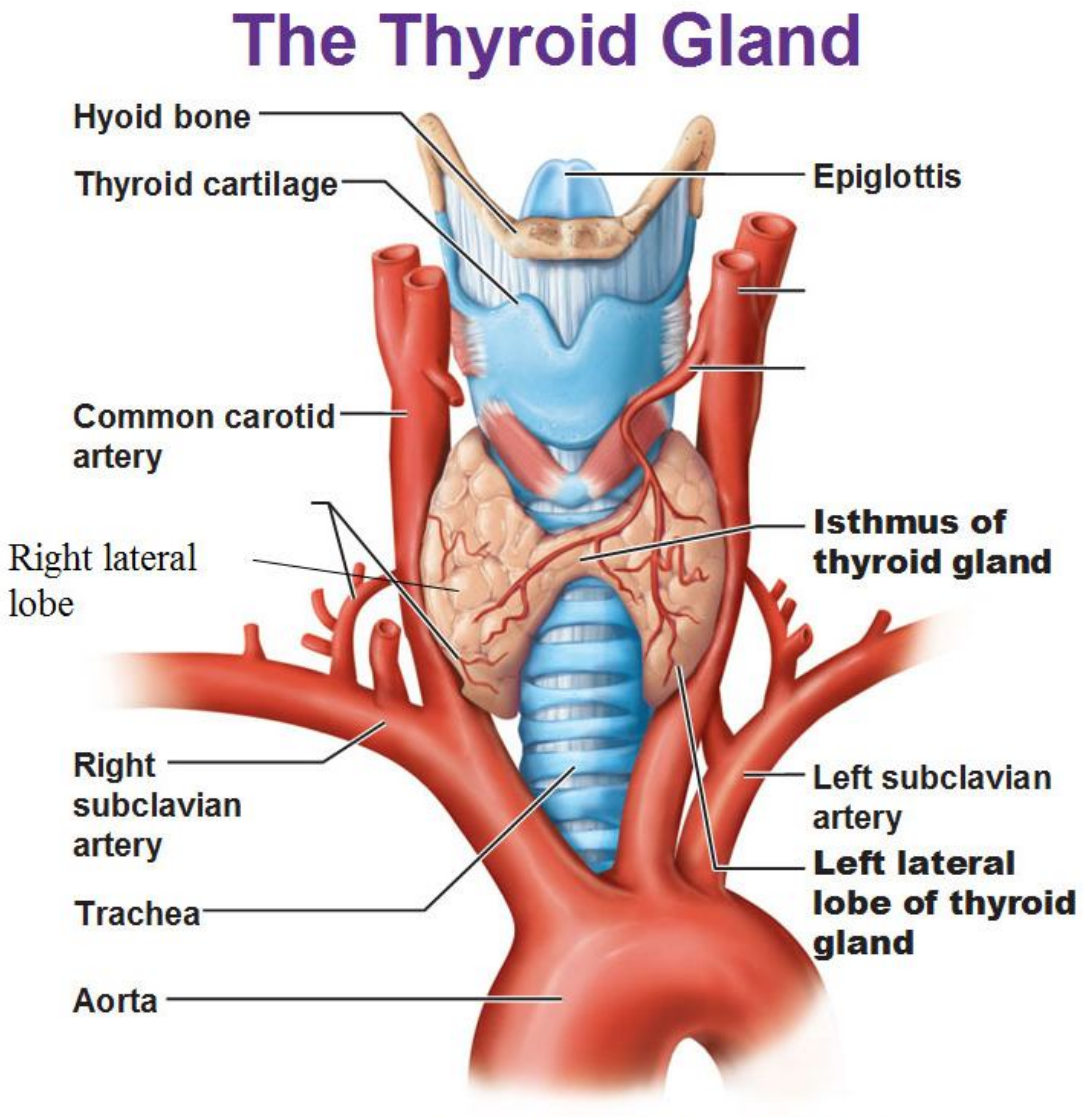
Class I : mandibular incisors can bite the upper lip above vermilion line.

Class II: mandibular incisors can bite the upper lip below the vermilion line

ClassIII ; mandibular incisors cannot bite the upper lip

ANATOMY OF THYROID GLAND

Thyroid gland is an endocrine organ, situated in the lower part of neck opposite to vertebrae c5, c6, c7 and t1.It is butterfly in shape. It consists of right and left lobe joined together by is thumus. A third pyramidal lobe projects upward from the is thumus. The upper pole of the thyroid gland is pointed, and the lower pole is rounded and broad.



Gross anatomy of the thyroid gland, anterior view

It extends from the middle of the thyroid cartilage to 4^{th} or 5^{th} tracheal rings. The isthumus extends from 2^{nd} to 3^{rd} tracheal ring.

Accesory thyroid gland may sometimes be present as small detached masses in the vicinity of lobes or above the isthumus.

It mainly regulates the basal metabolic rate, stimulates somatic and psychic growth. It also plays an important role in calcium metabolism.

CAPSULES OF THYROID GLAND

1) True capsule : It is the peripheral condensation of the connective tissue of the thyroid gland.
2) False capsule : It is derived from the pre tracheal layer of the deep cervical fascia

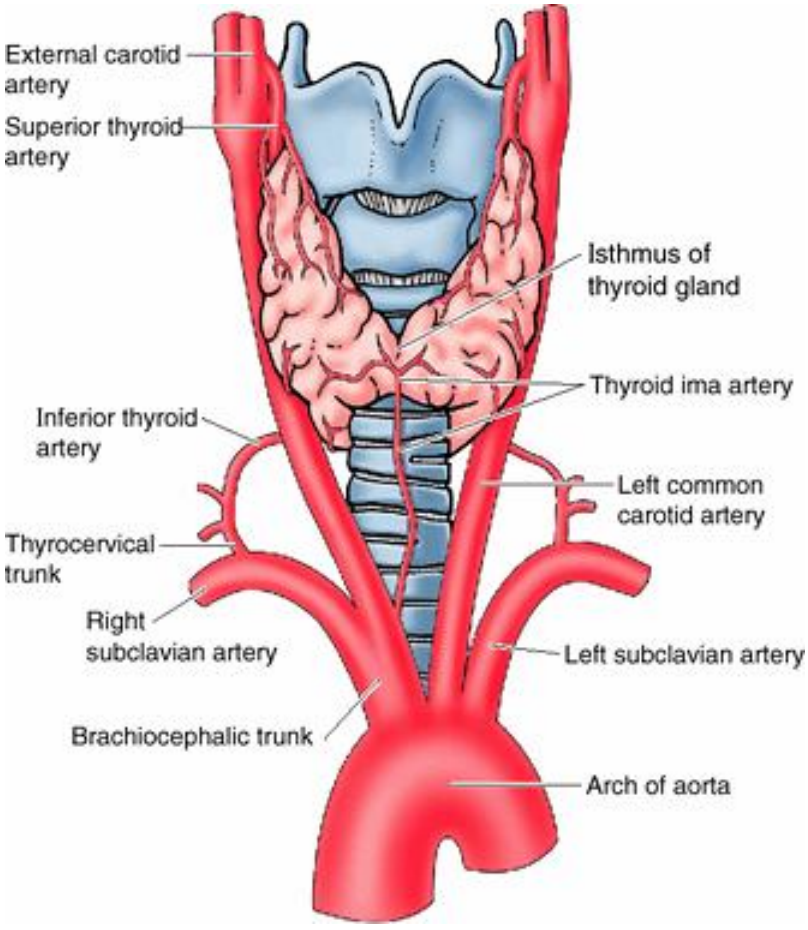
   Since there is presence of dense capillary plexus deep to the true capsule, to avoid bleeding during thyroidectomy, thyroid gland is removed along with the true capsule.

DIMENSIONS AND WEIGHT

Each lobe measures about 5cm x 2.5cm x 2.5cm and isthumus measures about 1.2 cm x 1.2 cm. The average weight of the gland is 25g. The gland is slightly larger in female than in male. During menstruation and pregnancy gland increases in size.

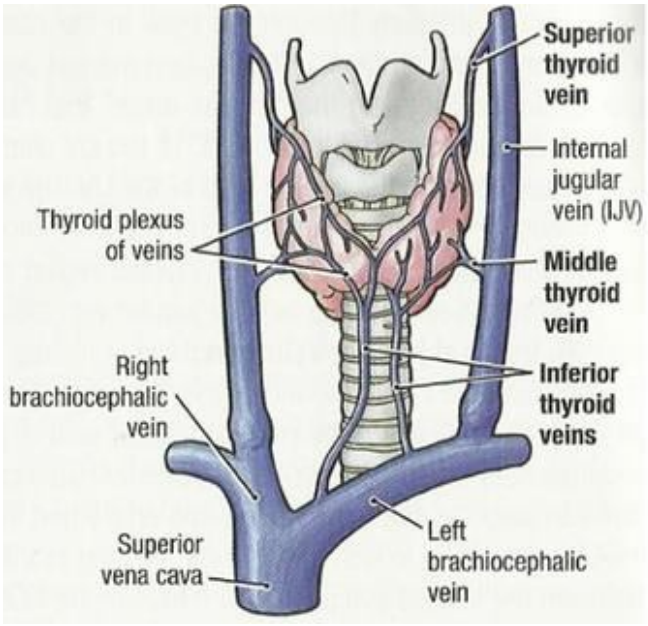
ARTERIAL SUPPLY

1) Superior thyroid artery : Is a branch of external carotid artery and divided into anterior and posterior branches. It supplies anterior and posterior lobes of thyroid respectively.
2) Inferior thyroid artery : A branch from the thyrocervical trunk which itself is a branch of subclavian artery.
3) Thyroidea ima artery : A branch from the brachiocephalic trunk or directly from the aorta. Accessory thyroid arteries which also supplies thyroid gland , arises from tracheal and esophageal areteries.



VENOUS DRAINAGE

1) Superior thyroid vein drains into internal jugular or in the common facial vein
2) Middle thyroid vein also drains in the internal jugular vein
3) The inferior thyroid vein drains in to brachio cephalic vein
4) A fourth thyroid vein known as koher's vein may lie between inferior and middle thyroid vein and drains in to the internal jugular vein

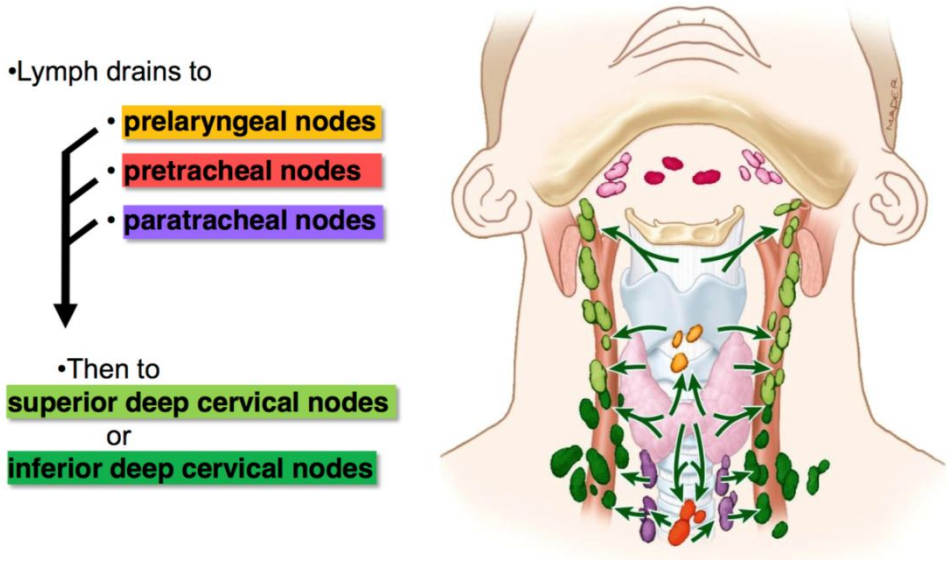


LYMPHATIC DRAINAGE

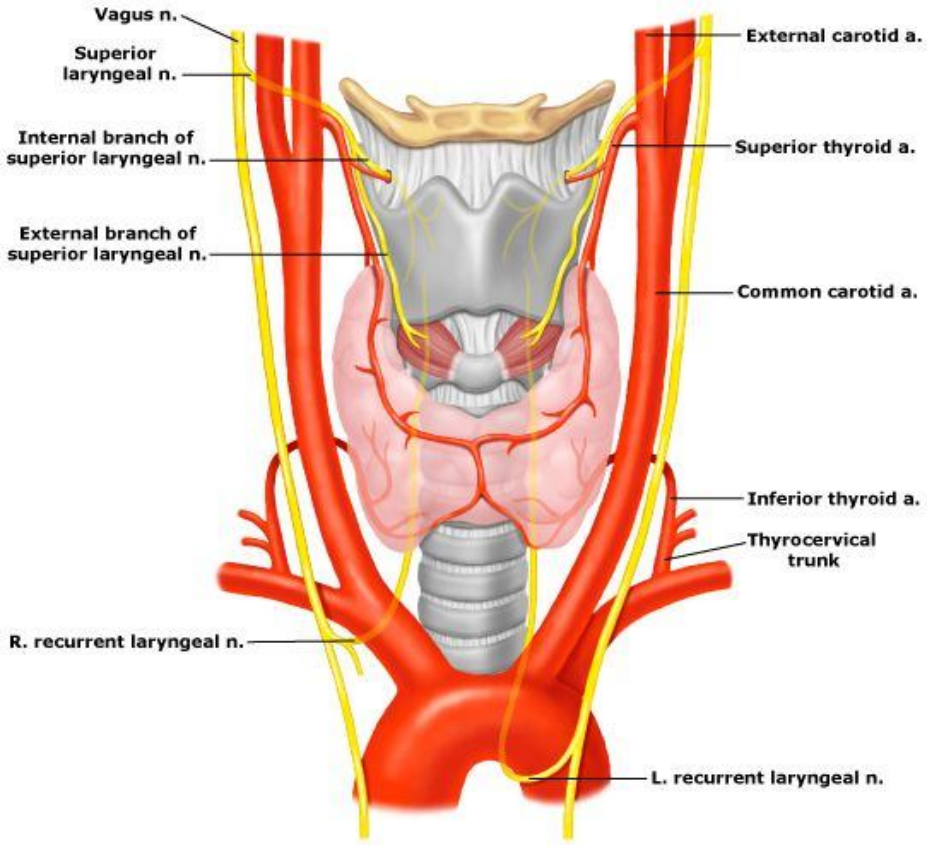
Lymphatics from the upper part of the gland drain into the upper deep cervical nodes directly or through the pre laryngeal nodes.

Lymphatics from the lower part of the gland either drain directly into the lower deep cervical nodes or through the pre tracheal and paratracheal nodes.

Thyroid gland



NERVE SUPPLY



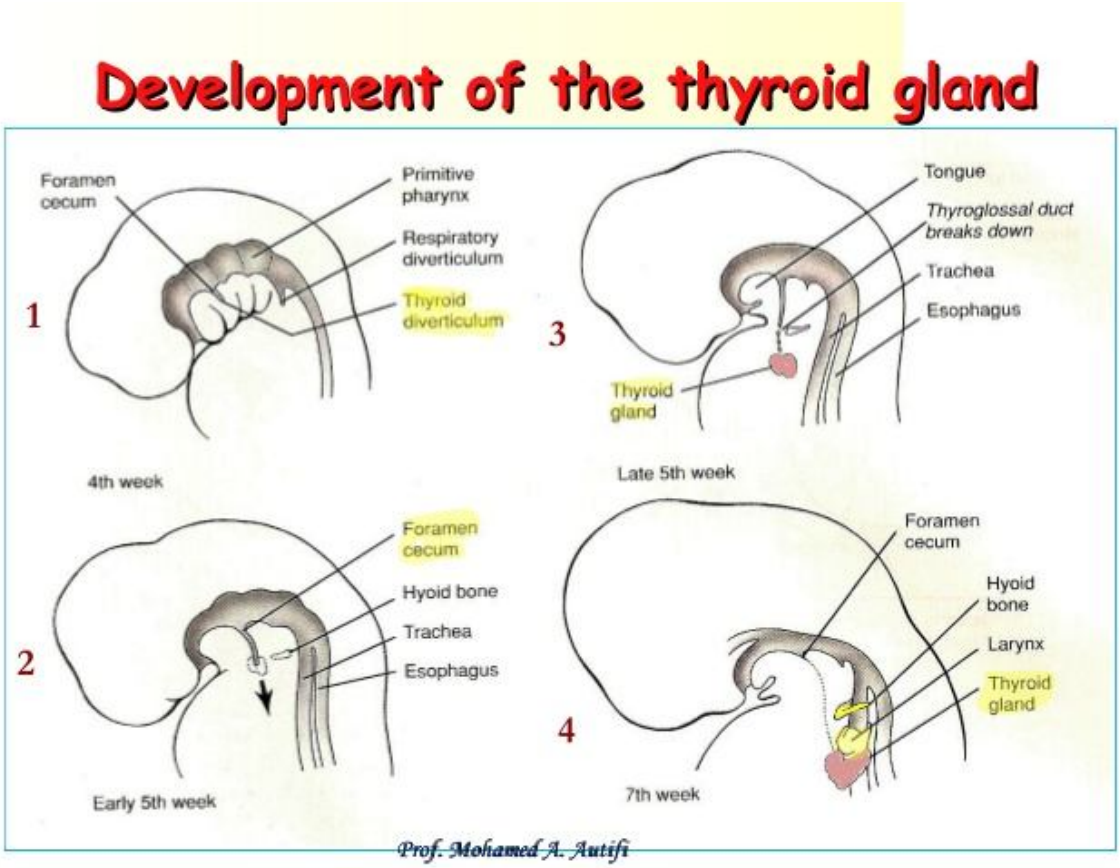
Thyroid gland is mainly supplied by the middle cervical ganglion and also partly from the superior and inferior cervical ganglion.

STRUCTURE AND FUNCTION

The thyroid gland consists of two types of secretory cells.

1) Follicular cells : It lines the follicles of the thyroid gland and secrete tri iodo thyronin and tetra iodo thyronin. It stimulates the basal metabolic rate and somatic psychic growth of an individual.
2) Parafollicular cells : It lies in between the follicles. They secrete calcitonin which promotes calcium deposition in bones and other tissues.

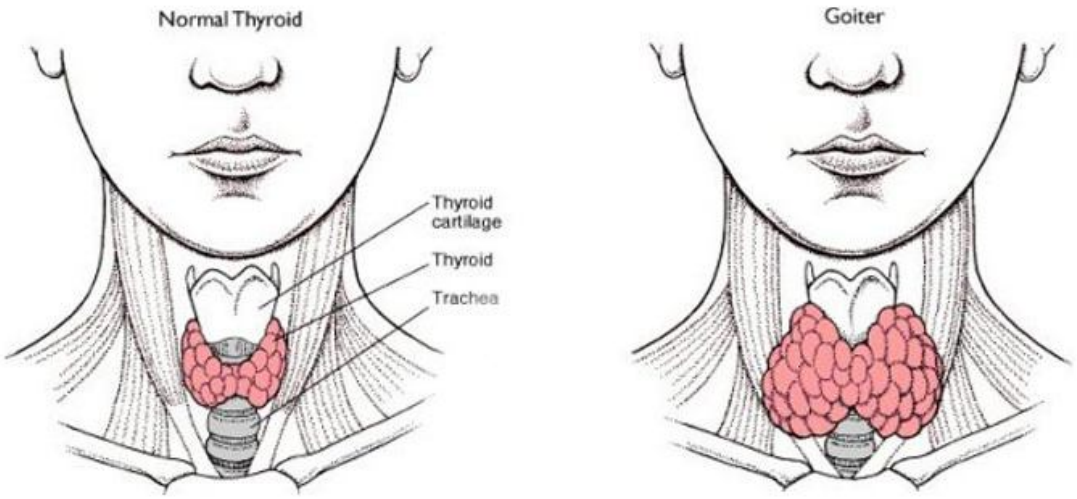
DEVELOPMENT



The thyroid gland developed from a median endodermal diverticulum, which grows in front of the neck and floor of the primitive pharynx, just caudal to the tuberculum impar. The lower end of the diverticulum enlarges to form the gland. The rest of the diverticulum remains narrow and is known as the thyroglosssal duct.

THYROID ENLARGEMENT

Generalised enlargement of the thyroid gland is known as goiter



CLASSIFICATION

SIMPLE

- Solitary nodular goiter
- Multinodular goitre
- Diffuse hyperplastic

TOXIC

- Diffuse
- Toxic adenoma
- Multinodular

NEOPLASTIC

- Benign
- Malignant

INFLAMMATORY

- Autoimmune
- Hashimoto’s thyroiditis
- Granulomatous
- Riedel’s thyroiditis

INDICATION FOR SURGERY IN THYROID SWELLING

Pressure symptoms

Cosmetic purpose

Toxic adenoma

Neoplasia

THROID SURGERY

Lobectomy = Unilateral total lobectomy + isthumusectomy

Subtotal thyroidectomy = Bisubtotal lobectomy + isthumusectomy

Total thyroidectomy = Bitotal lobectomy + isthumusectomy

REVIEW OF LITERATURE

1. Voyagis GS, Kyriakos KP. The effect of goiter on endotracheal intubation. Anesth Analg 1997;84:611–12.

The incidence of difficult endotracheal intubation in the presence of thyroid swelling was investigated. Authors selected 4742 consecutive adult patients who are undergoing general anesthesia. The prevalence of thyroid swelling was 6.8%. Preoperative airway assessment was performed by fifteen anesthesiologists using standardized guidelines. Here seven individual risk factors were correlated with the potential for difficult endo tracheal intubation.

In the presence of goiter or airway pathology indirect laryngoscopy and radiologic examination were done to rule out the presence of any anatomical deviation. There was no difference in probability of difficulty in endotracheal intubation between patients who presented for thyroidectomy and in patients where goiter was a incidental finding. Statistical analysis revealed an increased incidence of difficult endotracheal intubation amongst goitre patients compared with patients with no risk factor (6.8% vs 0.9%, $P < 10(-8)$, relative risk = 7.4).

This concluded that thyroid swelling, when accompanied by airway deformity, is a risk factor for difficult endotracheal intubation.

2. **J. Arne and others, "PREOPERATIVE ASSESSMENT FOR DIFFICULT INTUBATION IN GENERAL AND ENT SURGERY - PREDICTIVE VALUE OF A CLINICAL MULTIVARIATE RISK INDEX", British Journal of Anaesthesia, 80(2), 1998, pp. 140-146**

This prospective study was conducted with the objective of developing and validating a multivariate risk index for detection of difficult intubation.First,1200 consecutive ENT and general surgical patients were selected and five senior anaesthetists conducted pre operative airway examination on them. Induction technique was decided by the person anaesthetizing the patient, based on pre operative assessment. Difficult intubation was considered when special techniques were needed for intubation. In the second step, the effectiveness of simplified score, recorded in those 1200 patients was tested subsequently on 1090 patients by 17 senior <anaesthetists

MULTIVARIATE RISK INDEX

1. Previous knowledge of difficult intubation (no- 0 points, yes – 10 points)
2. Pathologies associated with difficult intubation. (no – 0, yes – 5).
3. Clinical symptom of airway pathology.(no -0,yes – 3)

4. Interincisor distance and mandibular (IID) and Mandibular Luxation (ML) (IID >= 5cm/ML >0 – 0 point, 3.5cm <IID <5 cm/ML = 0-3 points, IID < 3.5 cm/ML< 0 – 13 points).
5. Thyromental distance (>=6.5cm-0, < 6.5cm – 4)
6. Maximum range of head and neck movement (> 100* - 0, 90 *+/- 10* - 2,<80* - 5).
7. Modified mallampatti score (class I – 0, class II -2, class III-6,class IV -8)

Total possible score = 48.

Difficult intubation can be predicted if score > 11.

This multivariate index was found to be highly sensitive .Overall incidence of difficult intubation was 3.8%.This risk index had high negative predictive value, but a poor positive predictive value .False negative prediction was very low with this index (1 – 2%).

3. PREDICTING DIFFICULT INTUBATION IN APPARENTLY NORMAL PATIENTS – A META ANALYSIS OF BEDSIDE SCREENING TEST PERFORMANCE

Anaesthesiology 2005 ;103 :429 -37.Toshiya Shiga et al

This study Meta Analysed the diagnostic accuracy of commonly used bedside screening tests in the preoperative period for predicting difficult intubation. Authors selected 35 prospective studies (50760 patients) from Medline and Cochrane registry . Cormack Lehane grades III/IV were considered indicative of difficult intubation. The overall incidence of difficult intubation was 5.8%.The diagnostic accuracies of Mallampatti classification, Thyromental distance and mouth opening were unsatisfactory. Though Sternomental distance had high positive likelihood ratio, the diagnostic performance remained inconclusive due to limited number of studies. Combination of Mallampatti Classification and

Thyromental distance more accurately predicted intubation difficulty. This combination had low sensitivity and high positive likelihood ratio. But limited number of studies limit definitive conclusions.

Incidence of difficult intubation was more among obese. In conclusion, Currently available bedside screening tests have poor diagnostic performance when used alone. Combination of tests may improve diagnostic value.

4. A SYSTEMATIC REVIEW(META- ANALYSIS) OF THE ACCURACY OF THE MALLAMPATTI TESTS TO PREDICT THE DIFFICULT AIRWAY

Anaesth Analog 2006:102:1867 -78.Anna Lee et al

This Meta Analysis was done by analyzing 42 prospective observational studies of patients undergoing General Anaesthesia who had pre operative Mallampatti assessments. These studies were selected from electronic databases and were conducted in the period of 1985 – 2004.3 studies were excluded from analysis due to inadequate data. Original Mallampatti test was used in 9 studies to predict difficult laryngoscopy and in 5 studies to predict difficult intubation. Modified Mallampatti test was used in 19 studies to predict difficult laryngoscopy and in 20 studies to predict difficult intubation.

When compared to original Mallampatti test, modified test was a good predictor of difficult intubation(p=0.04).The accuracy of original Mallampatti test in predicting difficult intubation was very poor.

Predictive value of Modified Mallampatti test in predicting difficult laryngoscopy was higher in obstetric patients. Mallampatti tests have poor predictive value in identifying difficult mask ventilation. The results of this Meta analysis questioned the routine use of Mallampatti tests. Mallampatti tests are insufficient if they are used alone. This Meta analysis recommends other airway parameters like neck extension, thyromental distance and dentititon..It should be used pre operatively in addition to Mallampatti tests.

5. A COMBINATION OF WILSON SUM SCORE AND COMBINATION OF MALLAMPATTI, THYROMENTAL DISTANCE AND STERNOMENTAL DISTANCE FOR PREDICTING DIFFICULT INTUBATION.

Macedonian journal of Medical sciences 2009 Jun 15; 2 (2):XX-XX Rudin Domi MD, MSc.

This double blinded prospective study was conducted on 426 patients aged > 14 years. Statistical analysis was made using SPSS 14.0 software. Incidence of difficult intubation was 8.7%(37).This study identified a significant correlation between age and difficult intubation. More over Mallampatti scoring had a poor sensitivity in identifying difficult intubation. But combination of Mallampatti test with Thyromental distance and Sternomental distance increased specificity. But the predictive value in identifying difficult intubation is lower for a combination of Mallampatti test, Thyromental and Sternomental distances than that of Wilson's sum score.

6. .Prediction of difficult tracheal intubation in thyroid surgery.

Bouaggad A1, Nejmi SE, Bouderka MA Abbassi O.Anesth Analog 2004:99:603 -6

The incidence of DEI in the presence of goiter (an enlargement of the thyroid gland) was investigated in this prospective study. The other factors linked to DEI was also evaluated. Here 320 consecutive patients who were posted for thyroidectomy were studied. Intubation difficulty scale was used here to evaluate DEI. Tracheal intubation was done by an unassisted anesthesiologist, and the intubation difficulty scale was calculated. A univariate analysis was performed initially which is, followed by a multivariate analysis. 17 patients had DEI. Tracheal intubation was easy in 36.9% of patients; 57.8 % patients had minor difficulty of intubation .In univariate analysis, Sex (male), body mass index, Mallampati class, thyromental distance, neck mobility, Cormack grade, cancerous goiter, and tracheal deviation or compression were identified as potential DEI risk factors. Cormack Grade III or IV and cancerous goiter were identified as risk factors with multivariate analysis. The conclusion of this study is that the large goiter is not associated with a more frequent DEI

7. **A Chaves, S Carvalho, M Botelho. Difficult Endotracheal Intubation In Thyroid Surgery: A Retrospective Study. The Internet Journal of Anesthesiology. 2008 Volume 22 Number 1.**

This is a retrospective study to evaluate the predictive value of the known risk factors and specific risk factors of DEI in patients who underwent elective thyroid surgery .It included 512 patients from anaesthesia medical records.

Results: the incidence of difficult endotracheal intubation was 12.7%. In the difficult endotracheal intubation group, all classic risk factors for DEI were greater (with a positive predictive relation for Mallampati grade and reduced cervical mobility). A positive predictive value was also correlated with the diagnosis of compressive multinodular goitre. There was no risk factor in 24.6 % of patients with difficult airway .This corresponds to a false negative group.

8. **Preoperative airway assessment : predictive value of multivariate risk indexAR el-Ganzouri, RJ McCarthy,KJ Tuman, EN Tanck and AD Ivankovich Department of Anaesthesiology, Rush – Presbyterian – St.Luke's Medical centre at Rush Medical college, Chicago, Illinois 60612, USA.**

This is a multivariate model for stratifying risk of DEI. Its accuracy is compared to currently applied clinical methods. Here 10,507 consecutive patients were assessed prior to general anesthesia. Mouth opening, thyromental distance, oropharyngeal (Mallampati) classification, neck movement, ability to prognath, body weight, and history of difficult tracheal intubation were assessed. After induction of anesthesia, rigid laryngoscopy was done and laryngeal view was analysed and the ability of experienced anesthesia personnel to ventilate via a mask was also analysed. In 107 patients laryngoscopy was Grade IV and inability to achieve adequate mask ventilation were identified . Here all seven criteria were identified as independent predictors of difficulty with laryngoscopic visualization. A composite airway risk index exhibited higher positive predictive value for laryngoscopy Grade IV Mallampati score had similar sensitivity to Mallampati class III. Thus it concluded that improved risk stratification for difficulty with visualization during rigid laryngoscopy (Grade IV) can be obtained by use of a simplified preoperative multivariate airway risk index. It has better accuracy compared to oropharyngeal (Mallampati) classification at both low- and high-risk levels.

9. **Morbid obesity and tracheal intubation.Brodsky JB1, Lemmens HJ, Brock-Utne JG, Vierra M, Saidman LJ.Anaesth analg 2002 march :94(3) 732;6**

Here 100 morbidly obese patients with bmi >40 kg/m(2) were studied. Height, weight, neck circumference, width of mouth opening, sternomental distance, and thyromental distance) and Mallampati score were recorded preoperatively. Direct laryngoscopy view was graded, and also the number of attempts at tracheal intubation was recorded. Difficulty in intubation was not associated with absolute obesity. The predictors of potential intubation problems were large neck circumference and high Mallampati score. Thus it concluded that obesity as a single factor is not predictive of DEI. Large neck circumference and a high Mallampati score (greater than or equal to 3) may increase the potential for DEI in obese individuals.

10. Neck circumference to thyromental distance ratio: a new predictor of difficult intubation in obese patients W. H. Kim H. J. Ahn C. J. Lee B. S. Shin J. S. Ko S. J. Choi S. A. Ryu BJA: British Journal of Anaesthesia, Volume 106, Issue 5, 1 May 2011, Pages 743–74

123 obese (BMI≥27.5 kg m^{-2}) and 125 non-obese patients were compared to find the incidence of DEI. Intubation difficulty scale (IDS≥5) was used to determine this. The established predictors which includes high BMI, the Mallampati score, the Wilson score, NC, width of mouth opening, sternomental distance, TM, were compared with the NC/TM ratio to predict DEI in obese patients. In obese patients, intubation was difficult than in non-obese patients (13.8% *vs* 4.8%; *P*=0.016). Multivariate analysis also revealed that the intubation was difficult in obese patients. It included Mallampati score, the Wilson score, and NC/TM . NC/TM showed the highest sensitivity and a negative predictive value among these three indices.

MATERIALS AND METHODS

It is a prospective study, conducted in Department of Anaesthesiology, Madras Medical College – GGH. 100 adult patients satisfying inclusion criteria were enrolled in this study.

INCLUSION CRITERIA:

Elective adult thyroid surgery patients requiring general endotracheal

Anaesthesia.

Males and Females.whose

ASA physical status 1-2.

Age 18 years of age and older.

Who have given valid informed consent.

EXCLUSION CRITERIA :

The patients with following conditions are not included in this study.

Patients not satisfying inclusion criteria

Patients requiring other techniques for intubation such as rapid sequence Induction.

Patients intubated prior to surgery.

Patients with severe cardiovascular, hepatic or renal disease and mental illness.

Are unconscious or very severely ill.

Need for nasal intubation.

MATERIALS

Macintosh laryngoscope – current standard device.

Weighing machine calibrated to 1 kg.

Measuring tape calibrated to 0.5 cm

AIRWAY ASSESSMENT:

Previous anaesthesia records, H/O previous surgery, Trauma, Burns, Tumour in and around the oral cavity, Neck or cervical spine were asked in the history. H/O of systemic illness like diabetes, ankylosing spondylitis, rheumatoid arthritis were asked and recorded.

General examination included examination for facial anomalies, temperomandibular joint pathology, anomalies of mouth and tongue, pathology of nose, pathology of palate. Height in metre and weight in kilograms were recorded and BMI calculated.

Measurement of airway indices : Individual indices were measured.

Joint movement : Patient was asked to look the ceiling without raising eyebrow and range of movements measured.

NECK FLEXION :

Patient was asked to touch the manubrium sterni with chin and the range of movements measured.

TMJ FUNCTION :

Patient was asked to open his mouth wide open and the inter incisor distance measured. Examiners index finger was placed over the

tragus and the thumb over the mastoid process and the patient was asked to open the jaw and the sliding function of the mandibular condyle was assessed.

UPPER LIP BITE TEST:

The patient was asked to bite the upper lip with the lower incisor and graded as follows :

Class 1 : lower incisor can bite the upper lip above the vermilion line.

Class 2 : lower incisor can bite the upper lip below the vermilion line.

Class3: lower incisor cannot bite the upper lip.

THYROMENTAL DISTANCE :

Distance between thyroid notch and mental symphysis when the neck was fully extended and mouth closed.

STERNOMENTAL DISTANCE :

Distance between the sternal notch and mental symphysis when the neck was fully extended and mouth was closed**.**

EXAMINATION OF DENTURES :

Abnormalities like cracking, bucking, loose, artificial and absence of incisors were examined and recorded.

NECK CIRCUMFERENCE

Patients with neck circumference >50 cm had a greater chance of difficulty in intubations than those with < 50 cm.

BODY MASS INDEX

CLASSIFICEATION	BMI :KG.M2
Normal	18.5 – 24.9
Overweight	>25
Pre obesity	25 – 29.9
Obesity Class- I	30 – 34.9
Obesity Class- II	35 – 39.9
Obesity Class – III	>40

Samson & young modification of Mallampati grading :

The patient is kept in sitting position with maximal mouth opening, protruding tongue, without phonation and the observer's eye in level with patients mouth.The degree to which faucial pillars, uvula, soft palate and hard palate were visible were recorded and classified as follows :

Grade I : faucial pillars, uvula, soft palate and hard palate

Grade II : uvula, soft palate and hard palate are visible

Grade III : base of uvula or none, soft palate and hard palate are visible

Grade IV : only hard palate visible

After assessment patient shifted to operating room. Iv line started and monitors connected.Inj glycopyrolate 0.2 mg iv and Inj fentanyl 2ug/kg were given as premedication. Then preoxygenated with 100 % oxygen for 3 mins.

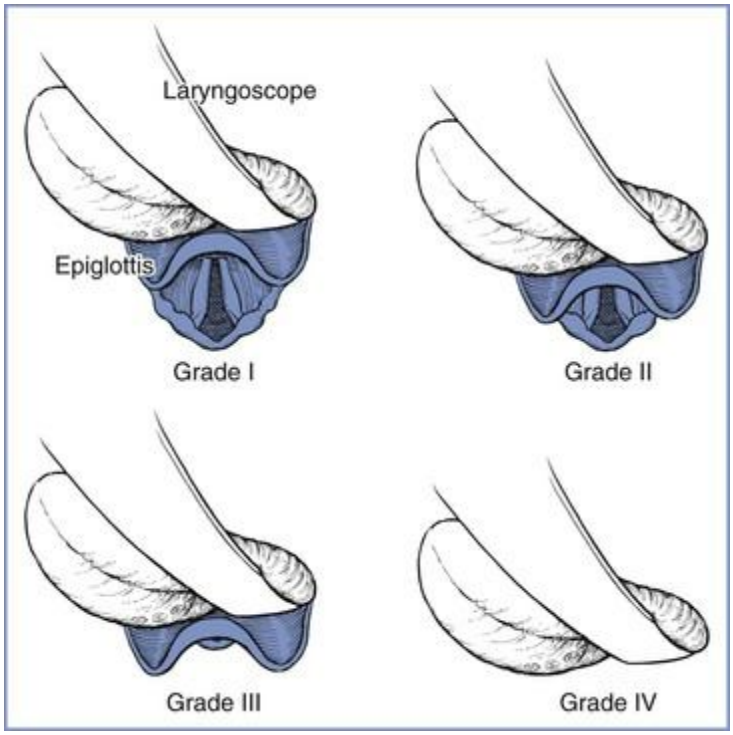
Induction done with Inj thiopentone 5mg/kg.Intubation is done following non depolarising blocker Inj atracurium 0.5mg/kg or depolarising blocker Inj suxamethonium 2 mg/kg.

In case of non depolarising blocker , face mask ventilation is done for 3 minutes. Quick look laryngoscopy done with Macintosh laryngoscope and the Cook's modification of Cormack – Lehane grading and intubation difficult score was noted.

COOK'S MODIFICATION OF CORMACK LEHANE GRADING AND INTUBATION DIFFICULTY SCORE WERE NOTED AS FOLLOWS :

CORMACK &LEHANE GRADING SYSTEM :

Entire vocal cord visualized	:	Grade – 1
Posterior part of vocal cords seen	:	Grade IIa
Arytenoids only seen	:	Grade IIb
Epiglottis only seen (liftable)	:	Grade IIIa
Tip of epiglottis only seen/ adherent	:	Grade IIIb
No glottis structure seen	:	Grade IV



INTUBATION DIFFICULTY SCORE :

Seven variables are used :

N1- Number of supplementary attempts.An attempt is defined as one advancement of tracheal tube in the direction of glottis during direct laryngoscopy.

N2 – The number of supplementary operators directly attempting (not assisting)

N3 – The number of alternative techniques used.

N4 – Glottic exposure as defined by the Cormack grade minus one.

N5 – Subjectively increased lifting force applied during laryngoscopy

N6 – The necessity of external latyngeal pressure.

N7 – Position of vocal cords.0 – abduction, 1 – adduction

APART FROM CORMACK- LEHANE AND INTUBATION DIFFICULTY SCORE THE FOLLOWING FACTOR WAS ALSO NOTED :

Intubation time : Measured from entry of the device into the oral cavity until confirmation of proper placement of tracheal tube.

Trauma during intubation is also noted.

OBSERVATION AND RESULT

This is a prospective study to evaluate the incidence of difficult endotracheal intubation in thyroid surgery .Body mass index, thyromental distance, interincisor distance were measured. Retrognathia, neck mobility, tracheal deviation and compression were also evaluated.

All data were collected and tabulated.

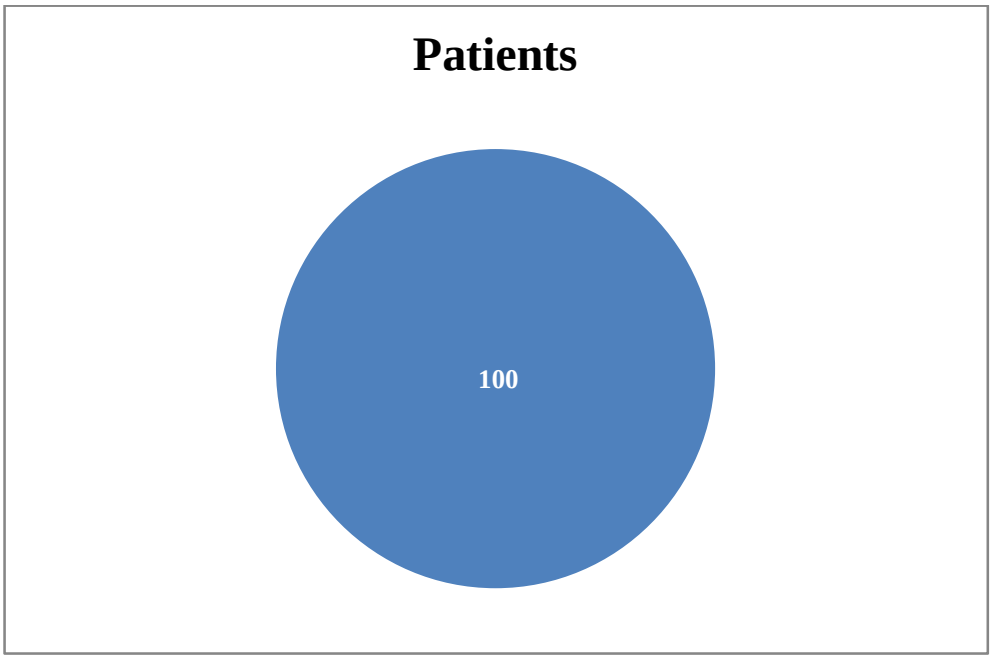
The collected data were analysed with IBM.SPSS statistics software 23.0 Version.To describe about the data, descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables.

Statistics

		AGE	BMI	TMD	IID
N	Valid	100	100	100	100
	Missing	0	0	0	0
Mean		39.18	24.0115	7.035	3.921
Median		40.00	23.9500	7.000	4.000
Std. Deviation		9.744	3.07052	.5999	.5711
Range		42	16.01	2.5	3.0
Minimum		18	16.39	6.0	3.0
Maximum		60	32.40	8.5	6.0

DEMOGRAPHIC VARIABLES:

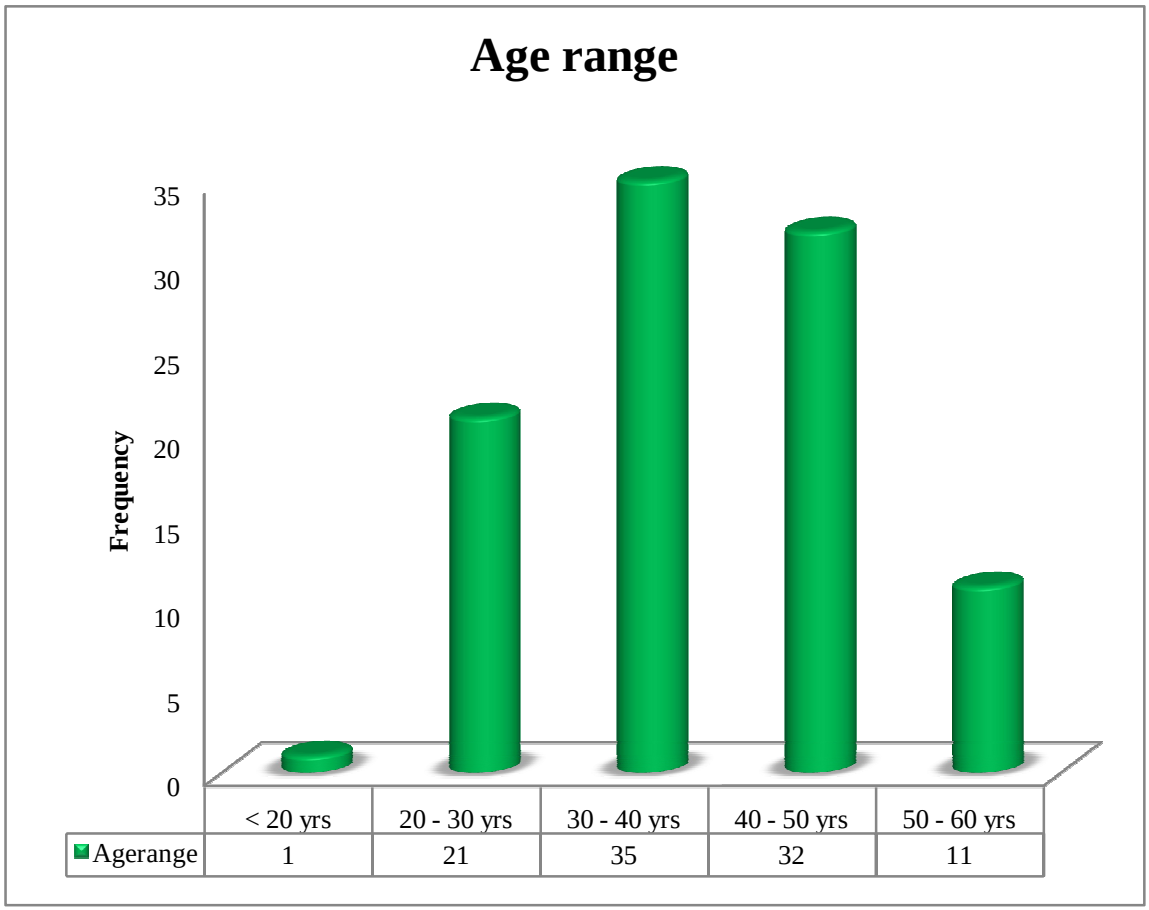
100 Patients posted for elective thyroid surgery were included in this study.



AGE DISTRIBUTION :

Age group of patients range from 18 yrs to 60 yrs.Majority of study population were in 30 to 40 yrs age group.

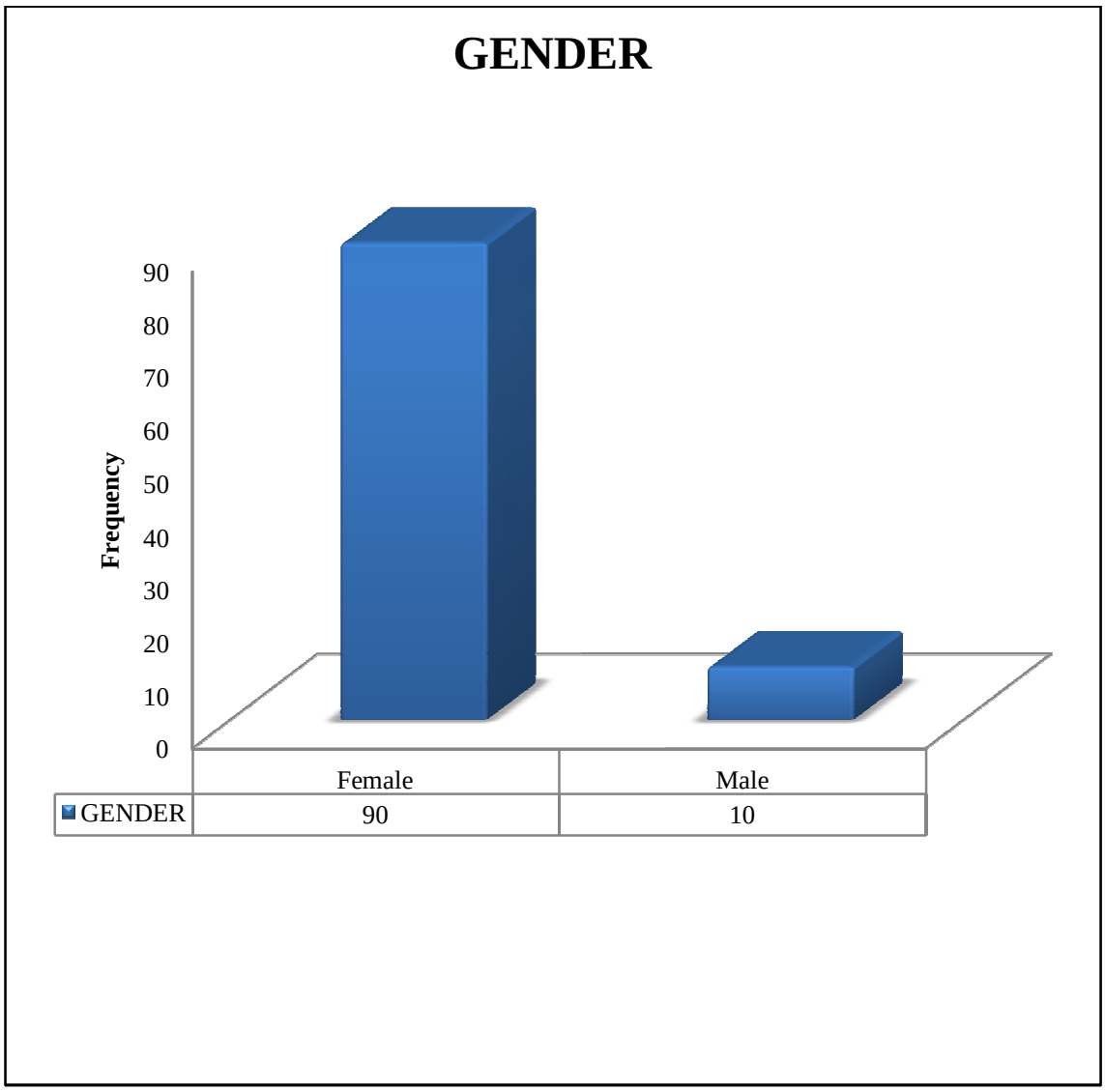
	Age range
< 20 yrs	**1**
20 - 30 yrs	**21**
30 - 40 yrs	**35**
40 - 50 yrs	**32**
50 - 60 yrs	**11**



SEX DISTRIBUTION:

Among the study population 10 % were male and 90 % were female.

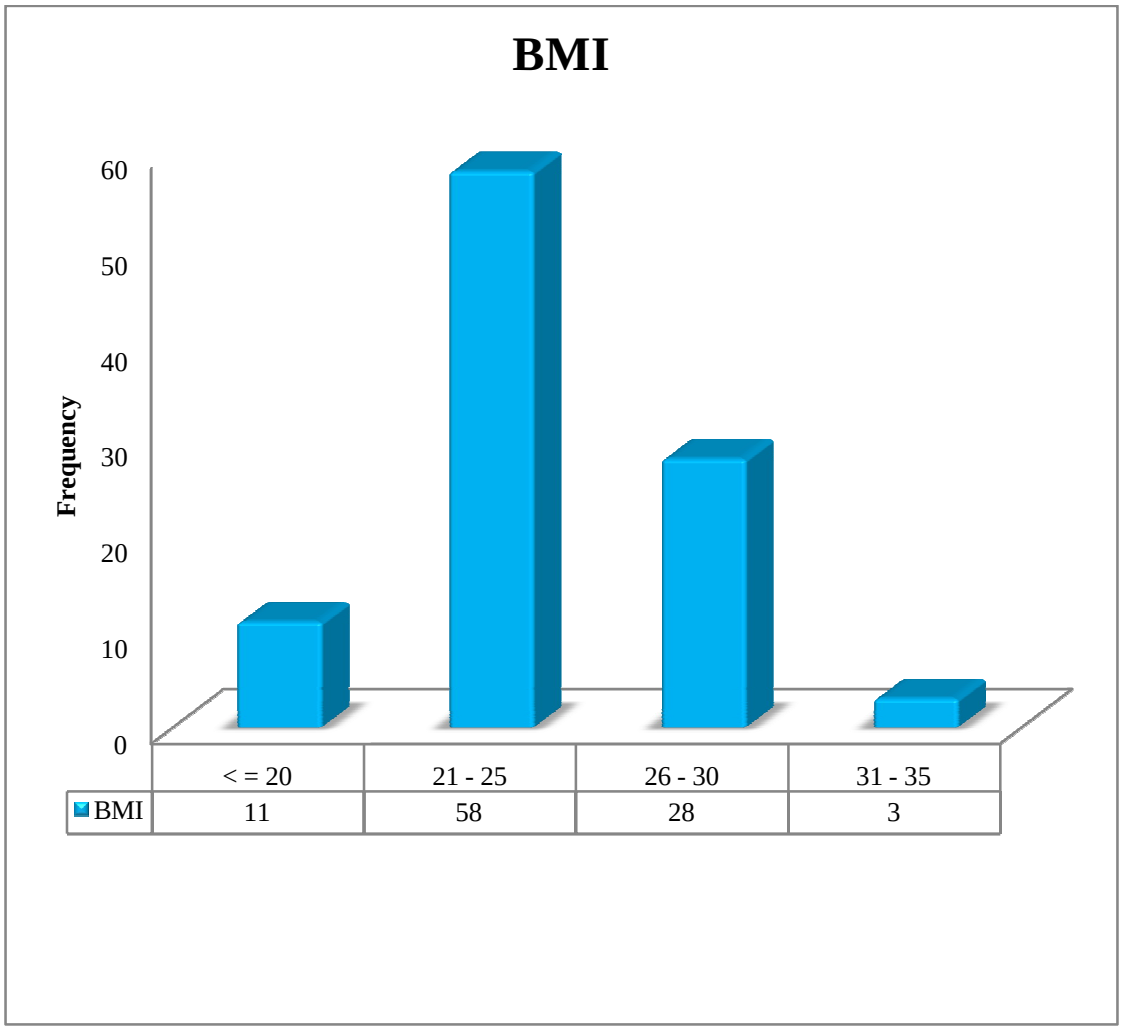
Female	90	90.0
Male	10	10.0
Total	100	100.0



Body Mass Index

BMI of patients ranges from 18 to 35. Majority ranges from 21 to 25.

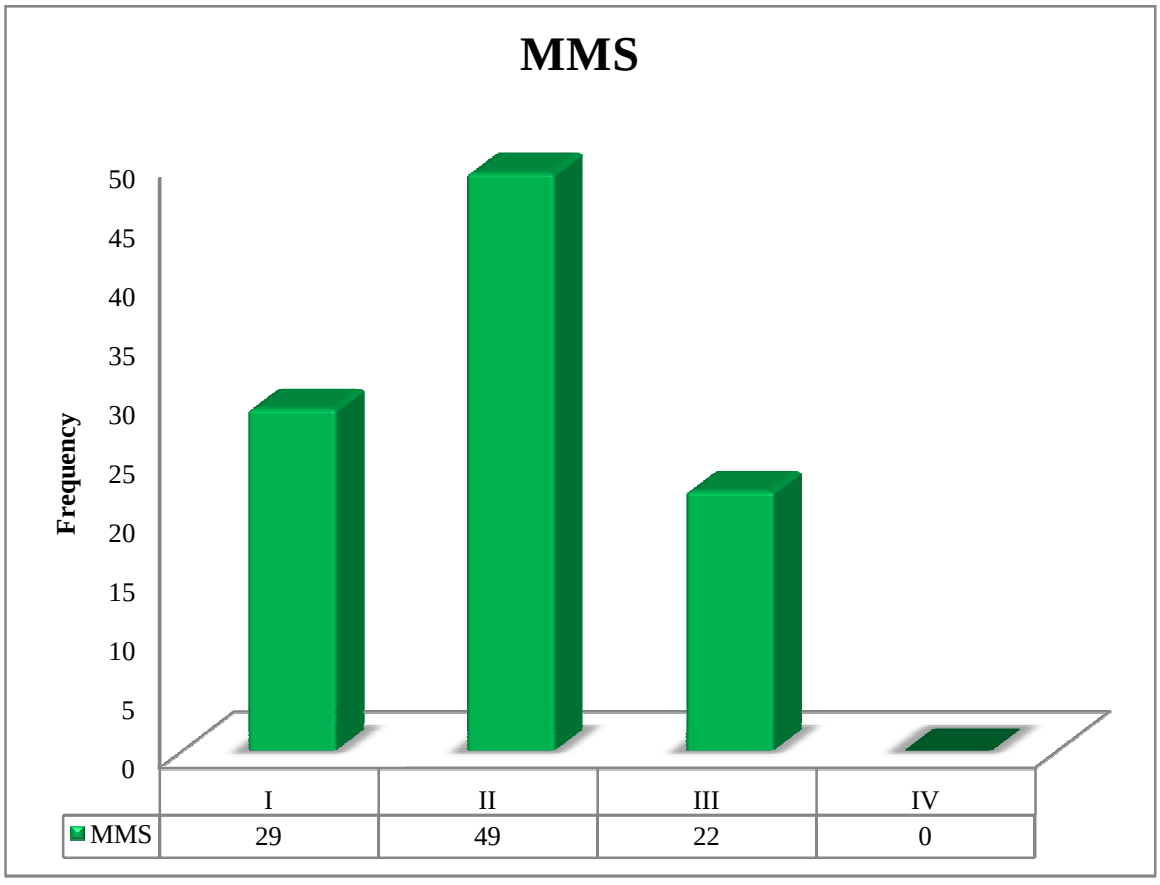
	BMI	Percent
< = 20	11	11.0
21 - 25	58	58.0
26 - 30	28	28.0
31 - 35	3	3.0
Total	100	100.0



MODIFIED MALLAMPATI CLASSIFICATION:

Modified Mallampati score distribution was 29 %/ 49 %/ 22 %.In most of the study population MMS was II.

	MMS	Percent
I	29	29.0
II	49	49.0
III	22	22.0
IV	0	0.0
TOTAL	**100**	**100.0**



OTHER AIRWAY INDICES :

Neck flexion ranged from 25^{o} to 35^{o}.Neck extension ranged from 30^{o} to 40^{o}

Thyromental distance ranges from 6.5 to 8.5 cm.

Interincisor distance ranges from 3 to 5 cm.

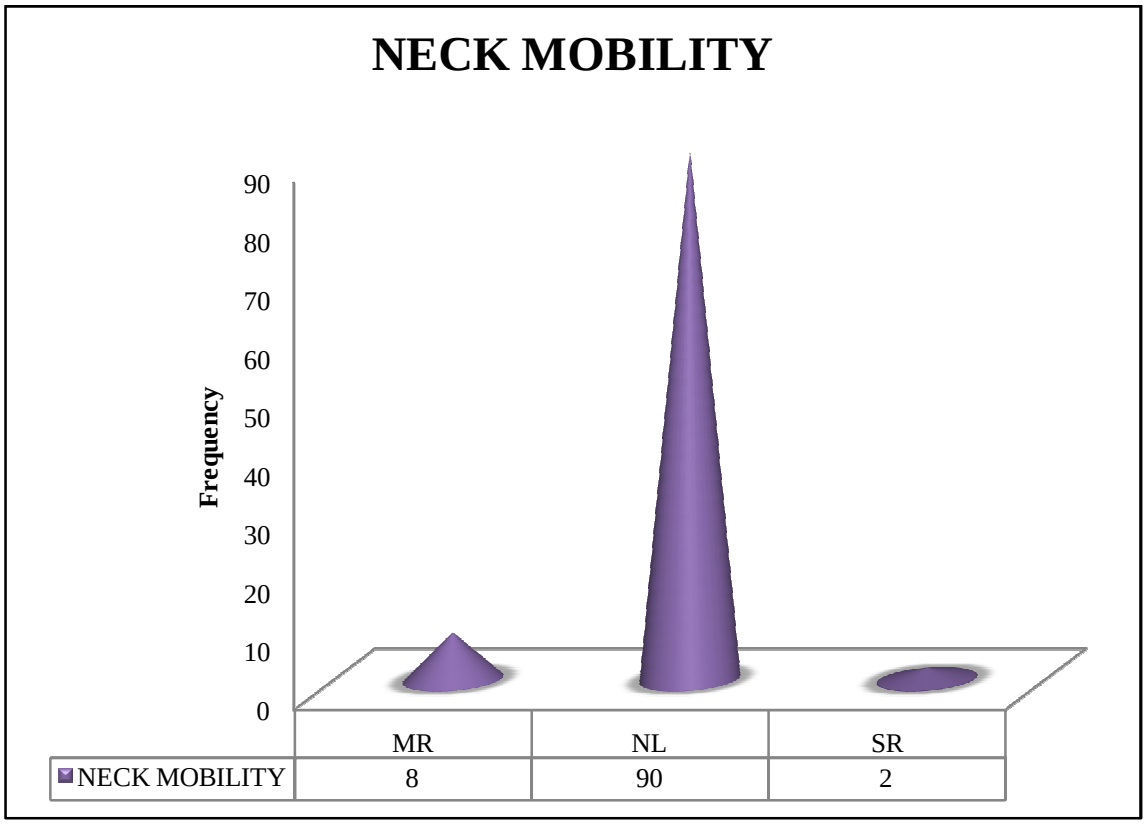
3 patients had aritificial dentures, 4 patients had buck tooth, 4 patients had loose tooth, and 1 patient was edentulous.

In upper lip bite test, 85 persons scored one and 15 persons scored 2.

NECK MOBILITY

Regarding neck mobility there was no limitation in 90% of population.8% had mild restriction in neck mobility and 2 % had severe restriction in neck mobility.

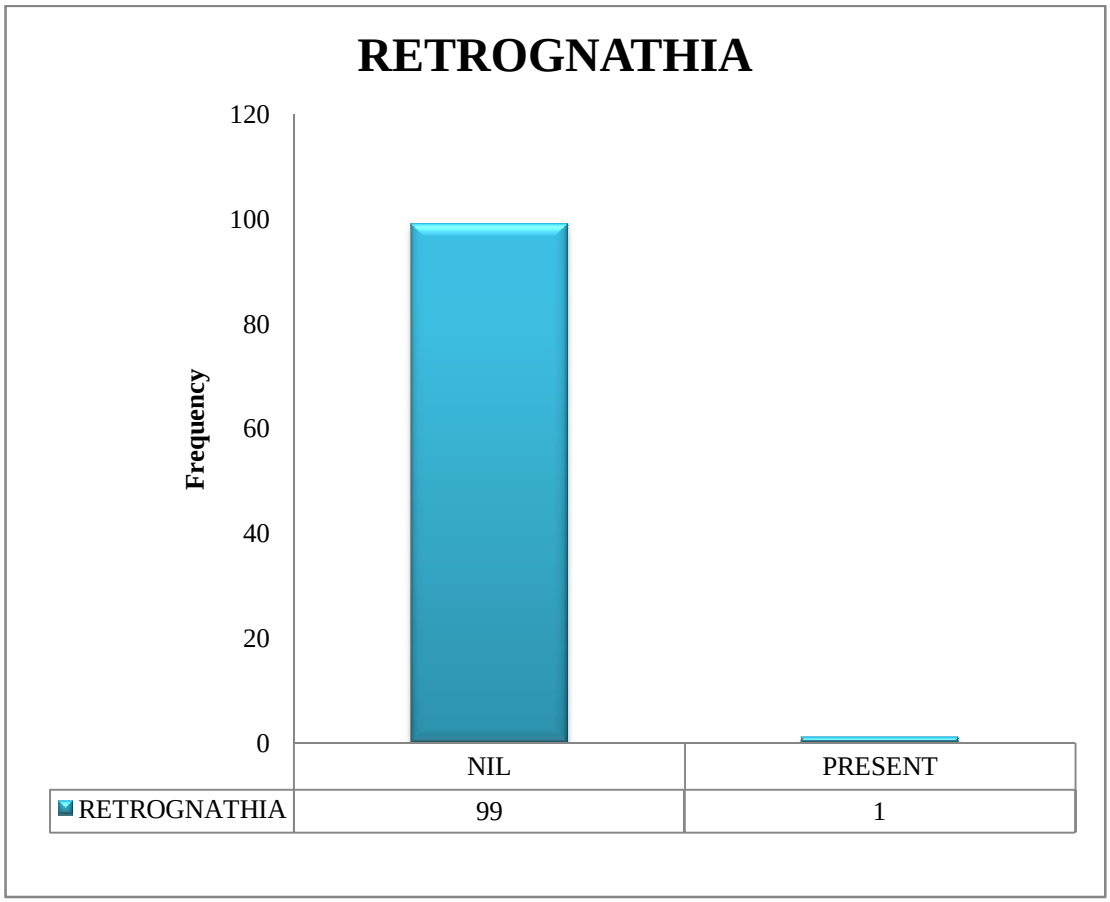
NECK MOBILITY	NO OF PERSONS	Percent
MR	8	8.0
NL	90	90.0
SR	2	2.0
Total	**100**	**100.0**



RETROGNATHIA

Retrognathia was present in 1% of population and absent in 99% of population.

RETROGNATHIA	NO OF PERSONS	Percent
NIL	99	99.0
PRESENT	1	1.0
Total	**100**	**100.0**



DIAGNOSIS

Regarding diagnosis of the study population ,

Solitary nodular goitre was present in 48% of population

Multinodular goitre was present in 25% of population

Toxic multinodular goitre was present in 11% of population

Follicular carcinoma thyroid was present in 9% of population

Papillary carcinoma thyroid was present in 2 % population

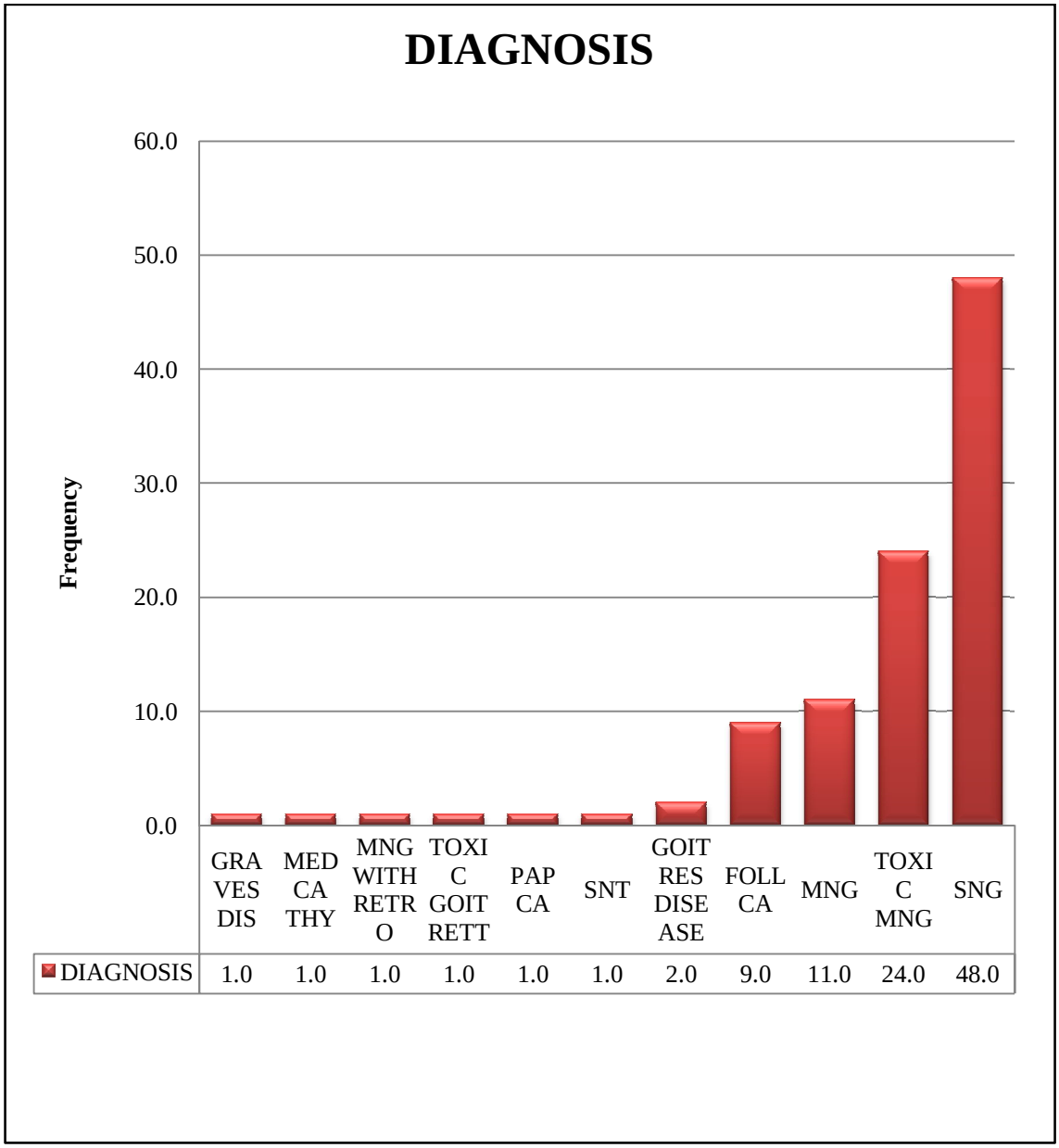
Medullary carcinoma thyroid was present in 2% population

MNG with retrosternal extension was present in 1%population

Graves disease was present in 1%population

Goitres disease was present in 1%population

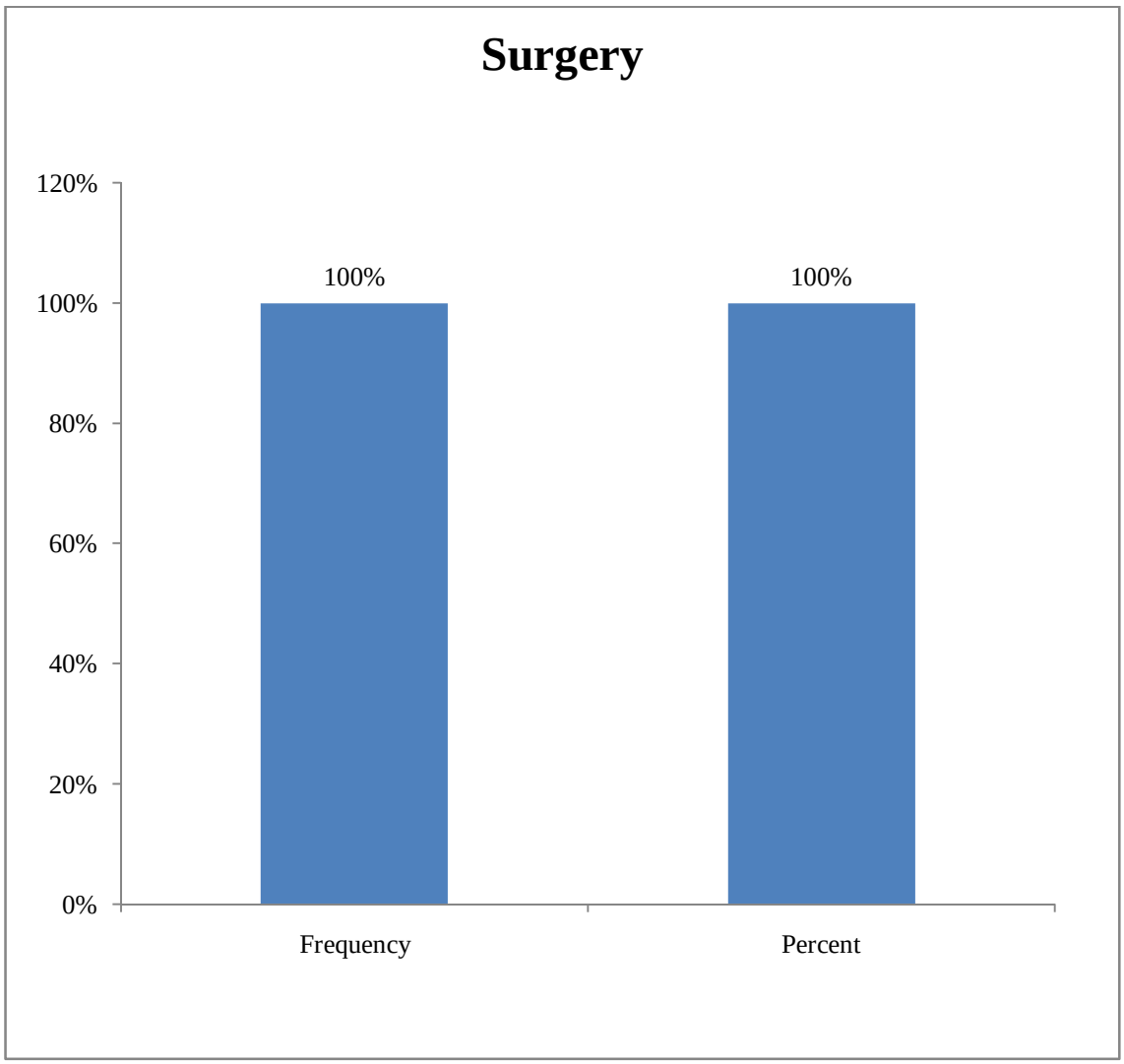
Diagnosis	Percentage	No of persons
MEDULLARY CA	2.0	1
MNG WITH RETROSTERNAL EXTENSION	1.0	1
PAP CA	2.0	2
GOITRES DISEASE	2.0	2
FOLLICULAR CA	9.0	9
TOXIC MNG	11.0	11
MNG	25.0	25
SNG	48.0	48
GRAVES DISEASE	1.0	1


DIAGNOSIS
Frequency
60.0
50.0
40.0
30.0
20.0
10.0
0.0
GRA VES DIS
MED CA THY
MNG WITH RETR O
TOXI C GOIT RETT
PAP CA
SNT
GOIT RES DISE ASE
FOLL CA
MNG
TOXI C MNG
SNG
DIAGNOSIS
1.0
1.0
1.0
1.0
1.0
1.0
2.0
9.0
11.0
24.0
48.0

Surgery

Total thyroidectomy was the surgery done in the study population.

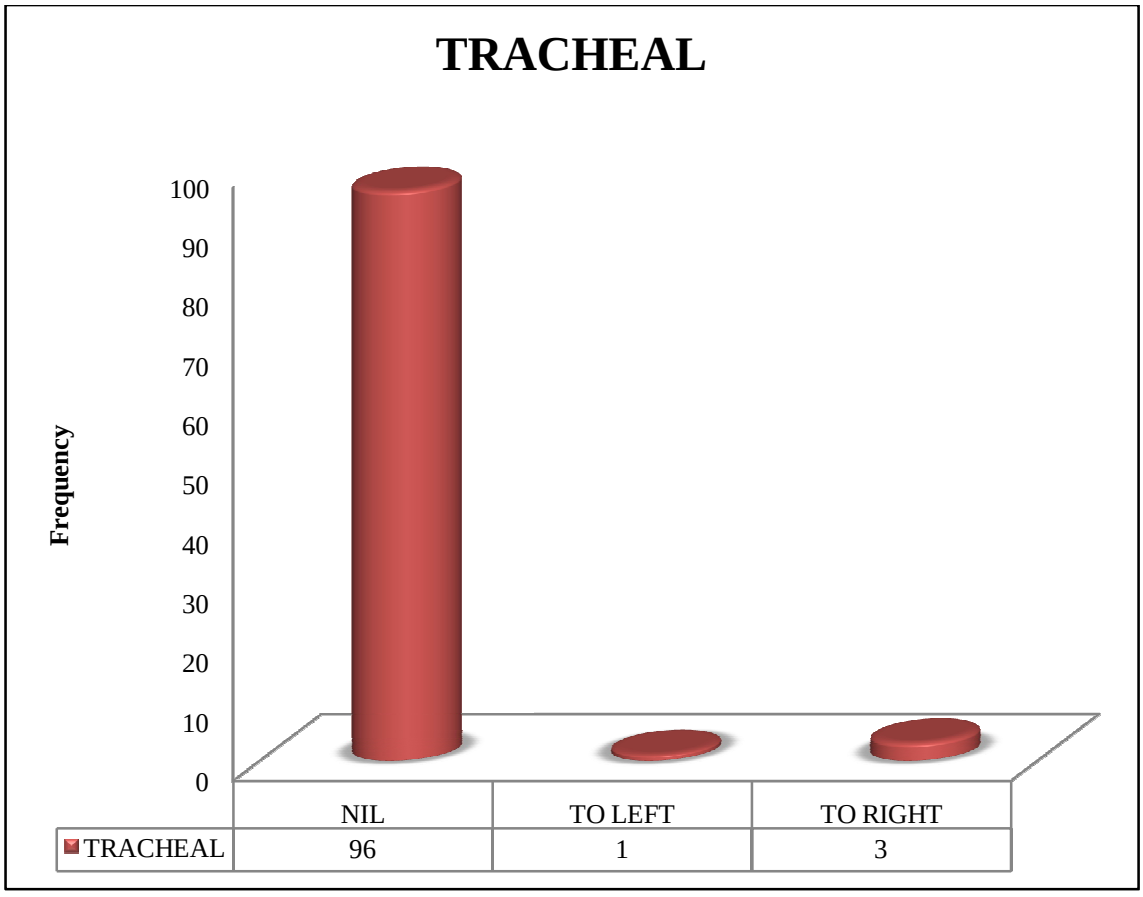
	Frequency	Percent
TT	100	100.0



Tracheal Deviation

Trachea was in midline in 96% of population. It is deviated to left in 1% of population and to right in 3% of population.

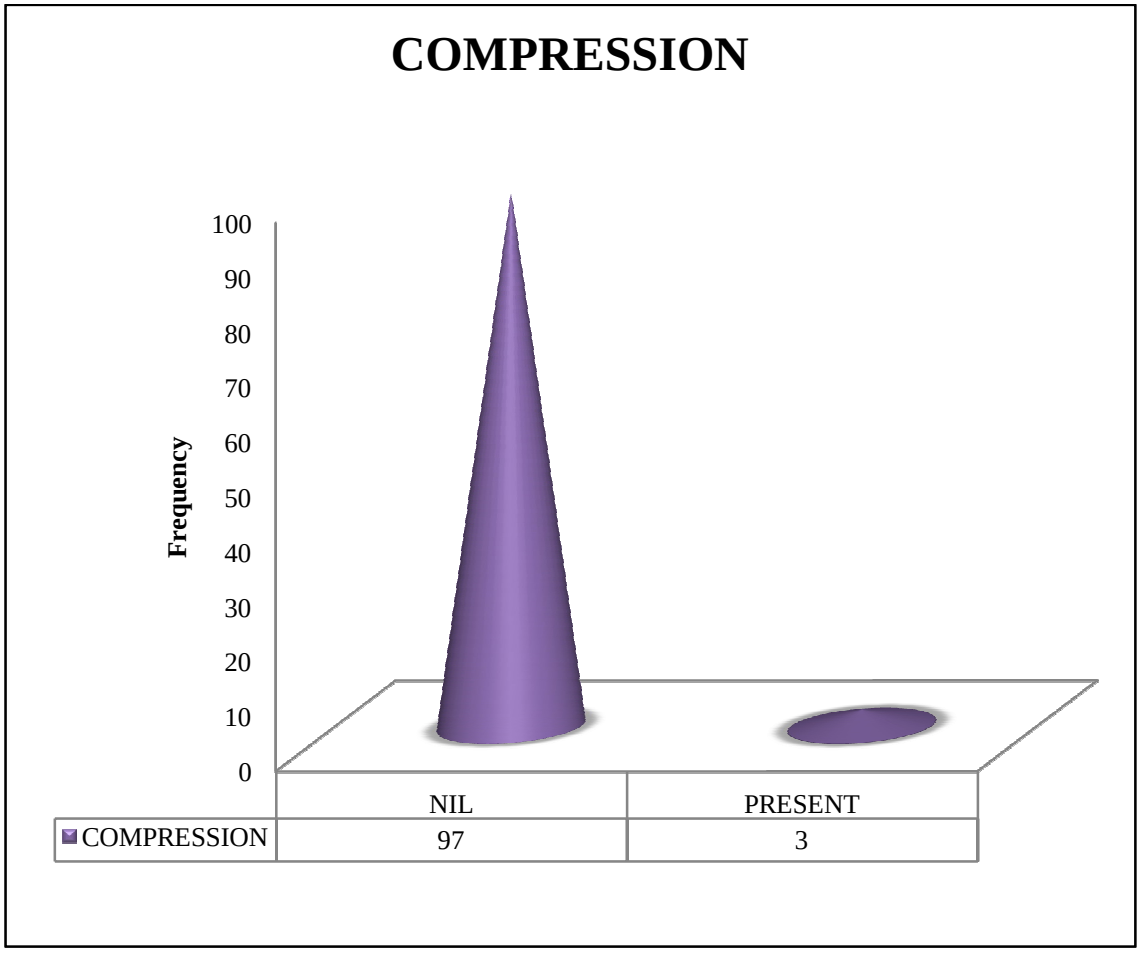
	TRACHEAL	Percent
NIL	96	96.0
TO LEFT	1	1.0
TO RIGHT	3	3.0
Total	**100**	**100.0**



Tracheal Compression

Tracheal compression was absent in 97 % population and present in 3 % of Population.

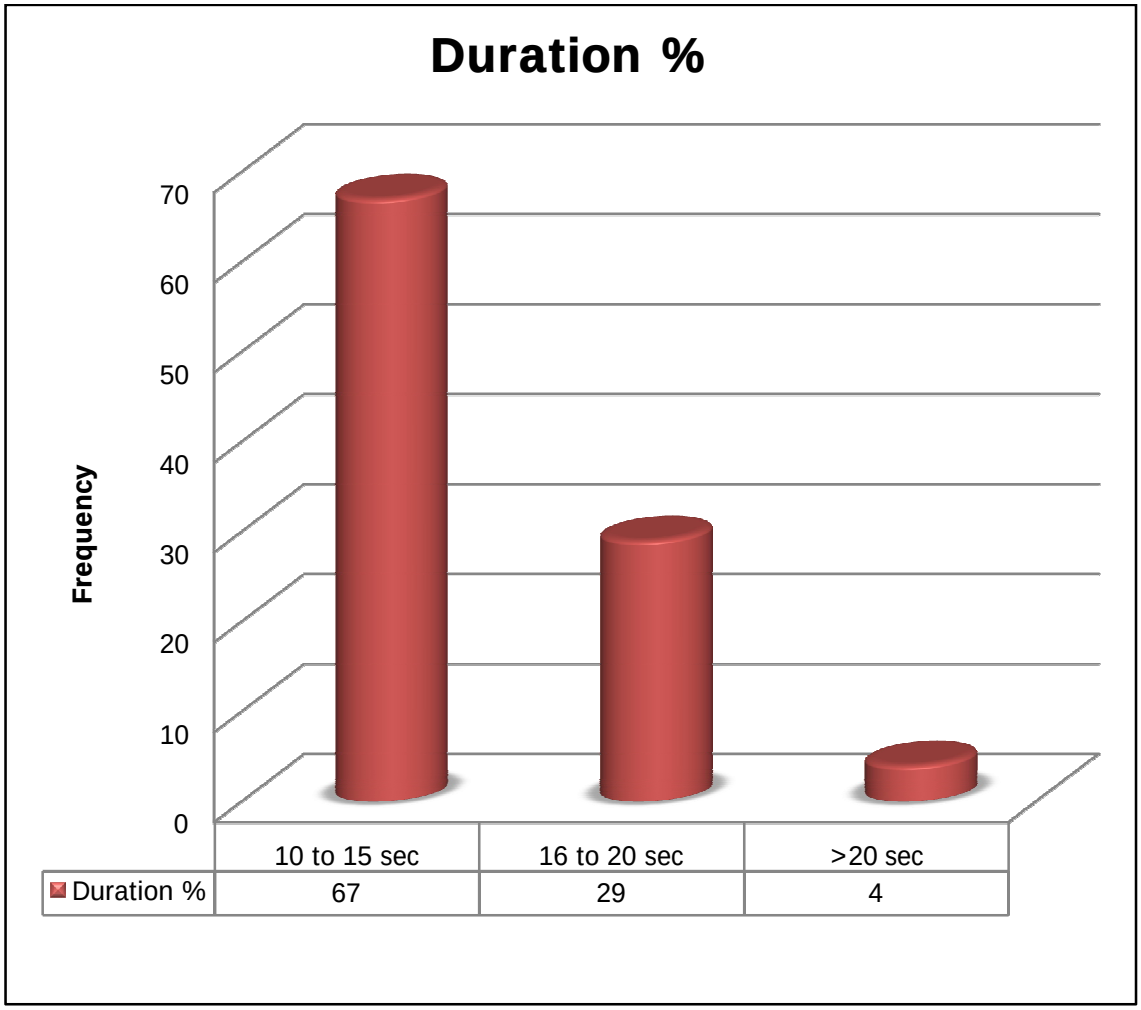
	COMPRESSION	Percent
NIL	97	97.0
PRESENT	3	3.0
Total	**100**	**100.0**



Duration of Intubation

Regarding duration of intubation, 67% of population was intubated within 10-15 seconds, 29 % of population was intubated within 16 – 20 seconds, and in 4% of population intubation duration was more than 20 seconds.

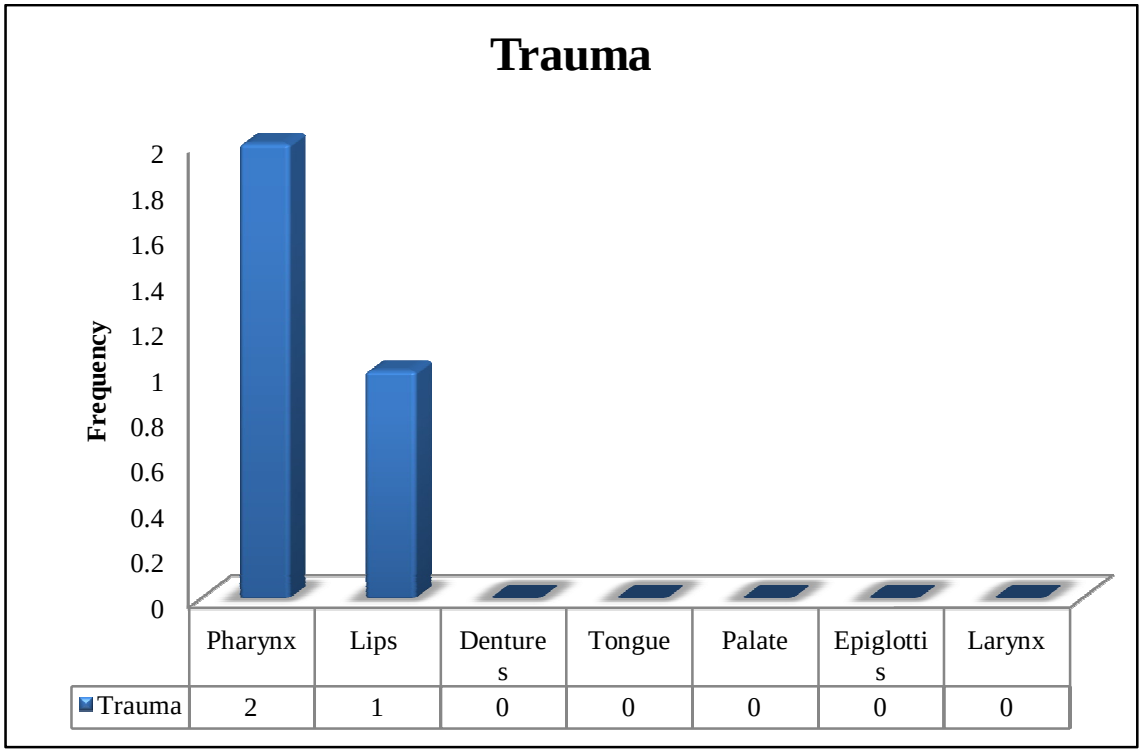
	Duration %
10 to 15 sec	**67**
16 to 20 sec	**29**
>20 sec	**4**


Duration %
Frequency
70
60
50
40
30
20
10
0
10 to 15 sec
16 to 20 sec
>20 sec
Duration %
67
29
4

Trauma during Intubation

Regarding trauma during intubation, trauma to pharynx was present in 2% of population and trauma to lips was present in 1% of population.

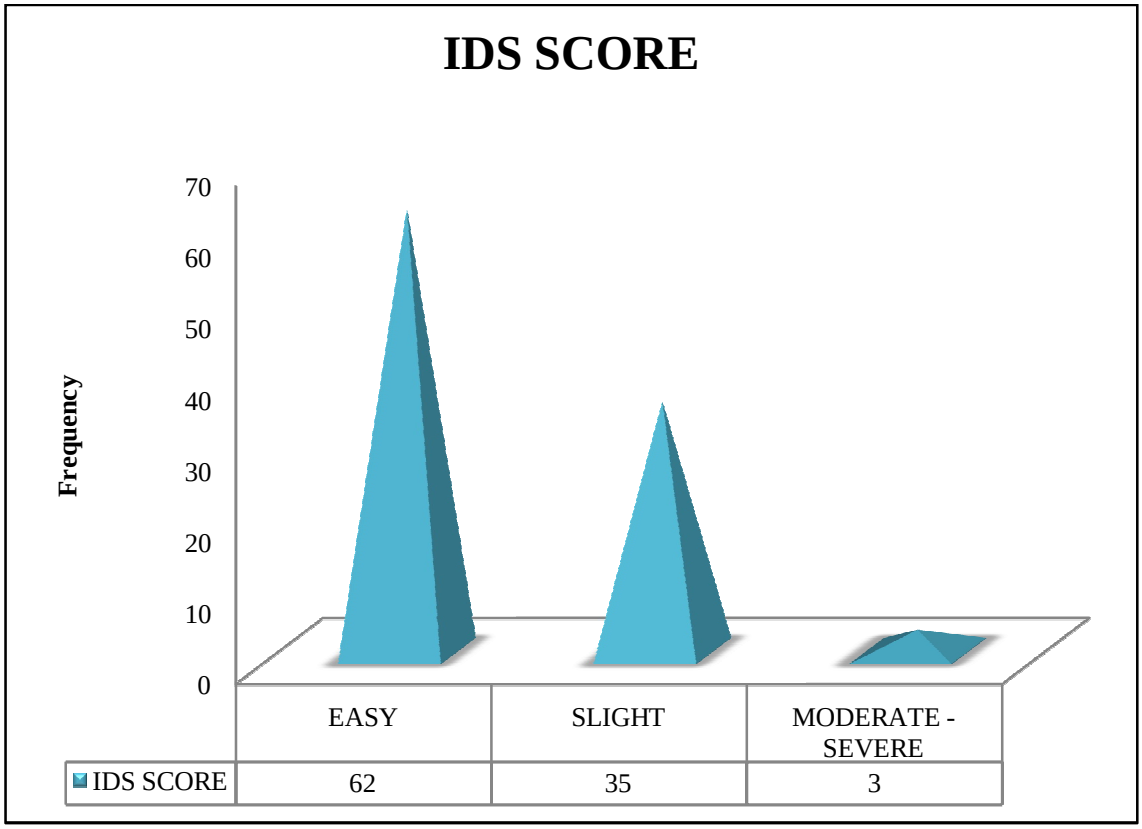
	Trauma
Pharynx	2
Lips	1
Dentures	0
Tongue	0
Palate	0
Epiglottis	0
Larynx	0



IDS

Regarding IDS score, easy intubation was found in 62 %of the population, slight difficulty in 35% of population and moderate difficulty in 3% of population.

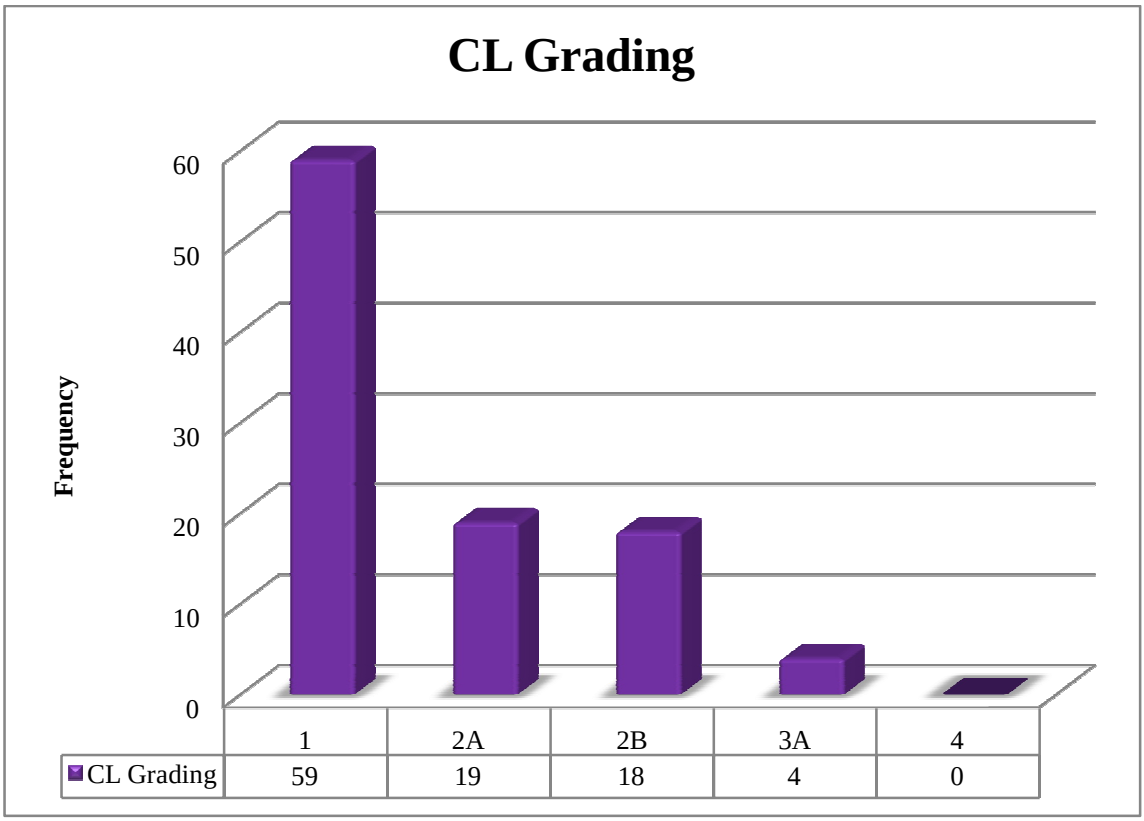
	IDS SCORE	Percent
EASY	62	62.0
SLIGHT	35	35.0
MODERATE - SEVERE	3	3.0
Total	**100**	**100.0**



CL Grading

Regarding CL grading 59 % of population had grade I, 19 % of population had grade 2A, 18 % of population had grade 2B, 4 % of the population had grade 3A

CL grading	
1	59
2A	19
2B	18
3A	4
4	0



DISCUSSION

Expert airway management is an essential skill of an anaesthesiologist.

A “Difficult airway” has been defined as the clinical situation in which a conventionally trained anaesthesiologist experiences difficulty with mask ventilation, with tracheal intubation or both. The incidence of difficult laryngoscopy and tracheal intubation is unknown, but it may be as frequent as 7.5% in the normal surgical population.

Difficulties with tracheal intubation are mostly caused by difficult direct Laryngoscopy with impaired view to the vocal cords. Many difficult intubations will not be recognized until after induction of anaesthesia. Unanticipated difficult intubation can lead to critical situations, especially in those patients who are at risk for gastric regurgitation, who are difficult to ventilate by mask or who have limited cardio-pulmonary reserves.

Difficult airway in general surgical population has been widely studied and Different algorithms are also established for it.But there are only few studies linked to the incidence of difficult endotracheal intubation in thyroid surgeries. Only few studies are done on the factors associated with difficult endotracheal intubation in thyroid surgeries.

When endotracheal intubation is failed, it causes morbidity and mortality in anaesthetized patients.Thus there is need to predict difficult endotracheal intubation in the presence of goitre.

The medical literature on this subject is confusing because multiple univariate and multivariate indices are proposed for predicting difficult intubation. There have been many attempts to develop a score to measure the complexity of endotracheal intubation.

Factors that have been associated with difficult laryngoscopy includes short sternomental distance, short thyromental distance,large neck circumference,limited head and neck movement, jaw movement,receding mandible and prominent teeth.

Only few studies have focused on the prediction of difficult endotracheal intubation in thyroid surgeries.This study is done to evaluate the incidence of difficult endotracheal intubation in thyroid surgeries .

Thyroid disorders can affect any age groups.18 to 60 yrs age group are included in this study.Majority of study population were under 30 to 40 yrs.

Thyroid disorders were more common in females than males. In this study

also, 90 % were women and 10 % were men.

According to 2005 WHO expert consultation criteria,a BMI >= 27.5 kg/m2 can be considered as obese in Asian population .In this study

6 people had BMI more than 27.5 .Out of which 2 people had difficulty in intubation .one person had slight difficulty and the other had moderate difficulty in intubation according to IDS score.

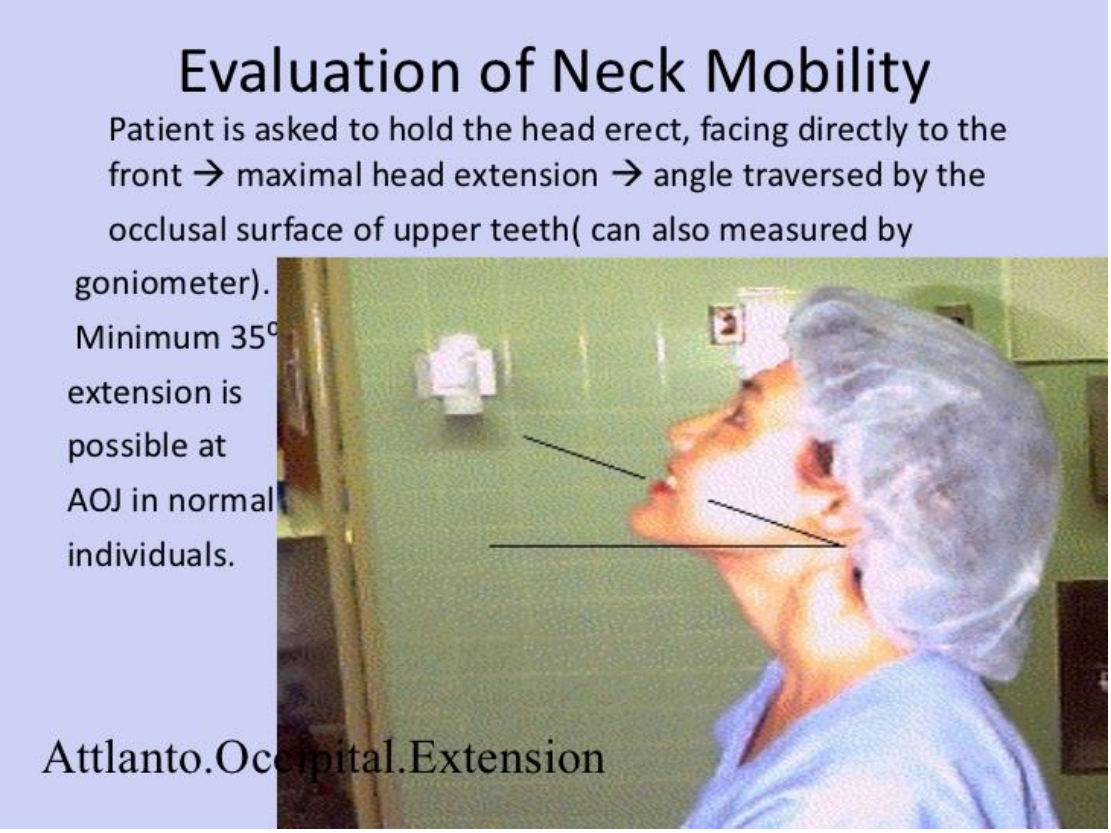
In 1985, S.Rao Mallampatti et al developed the Mallampatti classification of oropharyngeal view (class I – uvula, soft palate and faucial pillars visible, class II – soft palate and faucial pillars visible, tongue masks the uvula, class – III- only soft palate is visible) and validated this classification .They showed that inadequate exposure of oropharyngeal structures (Mallampatti class III and class IV) predicted difficult intubation with direct laryngoscopy. In this study 49% of the population had MMS II ,predicting easy intubation.

In 1996, thyromental distance was proposed as an predictor of difficult laryngoscopy, as it indicates the adequacy of mandibular space for lateralisation of tongue during direct laryngoscopy. Difficult intubation is more common when TMD <= 6.5cm compared to those with TMD > 6.5 cm. In this study population , 7% had < 6.5 cm thyromental distance and in those only 1% had difficult intubation. Difficult intubations were also present in those whose TMD was more than 6.5 cm. This does not correlate with previous studies.

Inter-incisor gap is also a predictor of difficult laryngoscopy. With the mouth open maxially, it is the distance which is measured between incisors.The inter incisor gap is affected by temperomandibular joint and

upper cervical spine mobility. If the gap is less than 3 cm intubation difficulty is more likely. In this study interincisor gap ranges between 3 cm to 5 cm which reveals difficult intubation is less.

Neck mobility is assessed using atlanto occipital joint extension - Sniffing or Magill position for intubation is assessed using this. oral, pharyngeal Pillarsand laryngeal axes are alligned into a straight line. The patient is asked to keep his head erect, face directed to the front, and then the head is maximally extended. The angle traversed by the occlusal surface of upper teeth is estimated. It can be measured by simple visual estimate or a goniometer can be used. Any reduction in extension is expressed in grades: Grade I : >35° Grade II : 22°-34° Grade III : 12°-21° Grade IV : < 12° Normal angle of extension is 35° or more. In this study neck extension was more than 35° in 86 % of Population and is limited to 30° in 14 % of population predicting easy Intubation. Neck flexion is ranged from 25° to 35°.Its the movement of head towards the chest. Neck rotation, left and right movements are also noted.



Abderrahmane Bouaggad's study on the prediction of difficult tracheal intubation in thyroid surgery concluded that difficult endotracheal intubation is not associated with large goitre.Two criteria were recognized as independent risk factors for difficult endotracheal intubation in thyroid surgery.They are Cormack grade III or IV and cancerous goiter. This study also concluded that Thyroid swelling is not associated with difficult endotracheal intubation .No independant risk factors were recognized in this study. Tracheal deviation and compression was present only in 3 % of population. So it is statistically insignificant in this study.

AIRWAY TRAUMA:

Minor degree of airway trauma noted in 3 patients.

1 patient had abrasion of lips; 2 patients had minor abrasion in pharynx

In the study conducted by Ishwar singh, abhijit khaund, Abhishek gupta, Department of Anaesthesiology, Jaipur Golden Hospital, New Delhi, No significant complication like oro –pharyngeal trauma or extreme pressor response was noted.

Acute traumatic injury to the lips, teeth, tongue, nose, pharynx, larynx, trachea and bronchi can occur during laryngoscopy and intubation. Minor trauma to the airway is common and incidence increases with increasing duration, increasing grade of difficulty, female gender and > 60 yrs age. Most traumatic complications do not result in major morbidity or mortality. However some require immediate recognition and management.

INTUBATION DURATION :

The mean time to intubate was 15 seconds.

Intubation time range was 10 to 25 seconds.

67 % were intubated in 10 to 15 seconds.

In the study conducted by Y.Toyama, N.Katsumi , T.Kunisawa , R.Sasaki K.Hirota the mean (SD) time required to place the tracheal tube was 20 seconds.

INTUBATION DIFFICULTY SCORE :

Intubation difficulty score was used to evaluate intubating conditions. It was developed by Adnet et al in 1997.It is a blend of subjective and objective criteria that permit a qualitative and quantitative approach to the progressive nature of the difficulty in intubation, and appears to be the best indicator till date.

In this scale, the value of IDS is ‘0’if full visualisation of the laryngeal aperture is possible during laryngoscopy and vocal cords are seen to be nicely abducted. Each variation from this defined ‘ideal’ intubation increases the degree of difficulty, the overall score being the sum of all variations from the definition.

According to Intubation difficulty scale, a score of 0 indicates easy intubation. A score of <5 indicates slight difficulty in intubation. A score of more than 5 indicates moderate to major difficulty in intubation.

In this study 62 % of the study population had easy intubation, 35 % of the study population had slight difficulty in intubation, and only 3 % had moderate difficulty in intubation.

SUMMARY

This study was conducted in the department of Anaesthesiology, Madras Medical College, Chennai – 3.100 patients posted for elective thyroid surgery were selected and pre operative assessment made with measurements BMI, TMD, IID, MMS, Neck mobility. Presence of retrognathia, tracheal deviation and compression were also noted. After induction IDS score was noted.

Statistical analysis showed that the incidence of difficult endotracheal intubation in thyroid surgery is less.

CONCLUSION

It is concluded that the incidence of difficult endotracheal intubation in thyroid surgery is less. In this study population no specific predictive factors were found to be associated with difficult endotracheal intubation in thyroid swelling

BIBLIOGRAPHY

1. Abderrahmane Bouaggad, MD, Sif Eddine Nejmi, MD, Moulay Ahmed Bouderka, MD, andOmar Abbassi, MD Department of Anesthesiology and Intensive Care, CHU Ibn Rochd Casablanca, Morocco . Prediction of Difficult Tracheal Intubation in Thyroid Surgery.
2. Voyagis GS, Kyriakos KP. The effect of goiter on endotracheal intubation. Anesth Analg 1997;84:611–12.
3. J. Arne and others, "PREOPERATIVE ASSESSMENT FOR DIFFICULT INTUBATION IN GENERAL AND ENT SURGERY - PREDICTIVE VALUE OF A CLINICAL MULTIVARIATE RISK INDEX",British Journal of Anaesthesia, 80(2), 1998, pp. 140-146
4. PREDICTING DIFFICULT INTUBATION IN APPARENTLY NORMAL PATIENTS – A META ANALYSIS OF BEDSIDE SCREENING TEST PERFORMANCE
   Anaesthesiology 2005 ;103 :429 -37.Toshiya Shiga et al
5. A SYSTEMATIC REVIEW(META- ANALYSIS) OF THE ACCURACY OF THE MALLAMPATTI TESTS TO PREDICT THE DIFFICULT AIRWAY
   Anaesth Analog 2006:102:1867 -78.Anna Lee et al
6. A COMBINATION OF WILSON SUM SCORE AND COMBINATION OF MALLAMPATTI, THYROMENTAL

DISTANCE AND STERNOMENTAL DISTANCE FOR PREDICTING DIFFICULT INTUBATION.

Macedonian journal of Medical sciences 2009 jun 15; 2 (2): XX-XX Rudin Domi MD,MSc. Prediction of difficult tracheal intubation in thyroid surgery.

7. Bouaggad A1, Nejmi SE, Bouderka MA Abbassi O.Anesth Analog 2004:99:603 -6 A Chaves, S Carvalho, M Botelho. Difficult Endotracheal Intubation In Thyroid Surgery: A Retrospective Study. The Internet Journal of Anesthesiology. 2008 Volume 22 Number 1.
8. Preoperative airway assessment : predictive value of multivariate risk indexAR el-Ganzouri, RJ McCarthy,KJ Tuman, EN Tanck and AD Ivankovich
9. Morbid obesity and tracheal intubation.Brodsky JB1, Lemmens HJ, Brock-Utne JG, Vierra M, Saidman LJ.Anaesth analg 2002 march :94(3) 732;6
10. Adnet F, Borrow SW, Racine SX, Clemessy JL, Fournier JL, Pliaisance P, Lapandry C., The Intubation Difficulty scale (IDS) :Proposal and evaluation of a new score characterizing the complexity of endotracheal intubation. Anaesthesiology 1997 Dec; 87(6); 1290 -7
11. Neck circumference to thyromental distance ratio: a new predictor of difficult intubation in obese patients

W. H. Kim H. J. Ahn C. J. Lee B. S. Shin J. S. Ko S. J. Choi S. A.

Ryu BJA: Bitish Journal of Anaesthesia, Volume 106, Issue 5, 1 May 2011, Pages 743–74

12. Samsoon GLT, Young JRB. Difficult tracheal intubation : a retrospective study. Anaesthesia 1987; 42: 487-490.
13. Banister FB,Mc Beth RG Direct laryngoscopy and tracheal intubation.Lancet 1964 ; 2 ;651
14. Bellhouse CP, Dove C .Criteria for estimating likelihood of difficulty of endotracheal intubation with the Macintosh laryngoscope.Anaesth intensive care 1988; 16 ;329

BOOKS :

15. Allan Klock Jr.P.,Jonathan L. Benumof.,Chapter 7.Definition and incidence of the difficult airway (p.218 – 219).,Benumof ‘s Airway management.,2nd edition.
16. James M.Berry.,Chapter 16.Conventional (laryngoscopic) orotracheal and nasotracheal intubation (single lumen tube) (p.381).,Benumof’s Airway Management .,2nd edition.
17. Robert G.Krohner, Sivam Ramanathan.,Chapter 1.Functional Anatomy of Airway (p.3 – 18).,Benumof’s Airway management., 2nd edition.
18. Section IV.,Chapter 33.Pharynx (p.561 – 568).,Gray’s anatomy.,40th edition.

ANNEXURE

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003

EC Reg.No.ECR/270/Inst./TN/2013
Telephone No.044 25305301
Fax: 011 25363970

15 MAR 2017

CERTIFICATE OF APPROVAL

To
Dr.Arthi.G
II Year Post Graduate in MD Anaesthesiology
Institute of Anaesthesiology & Critical Care
Madras Medical College
Chennai 600 003

Dear Dr.Arthi.G,

The Institutional Ethics Committee has considered your request and approved your study titled **"A PROSPECTIVE STUDY TO EVALUVATE THE INCIDENCE OF DIFFICULT ENDOTRACHEAL INTUBATION IN THYROID SURGERY" - NO.13022017 (II)**

The following members of Ethics Committee were present in the meeting hold on **21.02.2017** conducted at Madras Medical College, Chennai 3

1.Dr.C.Rajendran, MD.,	:Chairperson
2.Dr.M.K.Muralidharan,MS.,M.Ch.,Dean, MMC,Ch-3	:Deputy Chairperson
3.Prof.Sudha Seshayyan,MD., Vice Principal,MMC,Ch-3	: Member Secretary
4.Prof.B.Vasanthi,MD., Prof.of Pharmacology.,MMC,Ch-3	: Member
5.Prof.K.Ramadevi,MD.,Director,Inst.of Bio-Chc,MMC,Ch-3	: Member
6.Tmt.J.Rajalakshmi, JAO,MMC, Ch-3	: Lay Person
7.Thiru S.Govindasamy, BA.,BL,High Court,Chennai	: Lawyer
8.Tmt.Arnold Saulina, MA.,MSW.,	:Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary - Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

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16

PATIENT INFORMATION FORM

The purpose of this study is to predict the difficulty in intubating the trachea in thyroid swelling patients during general anaesthesia and taking necessary precautionary steps to prevent any adverse events occurring because of failure of intubation.

In this study patients who are giving consent to take part are included. Your (patient) airway will be assessed (this is routinely done before giving anaesthesia to any patient) for predicting difficult intubation. Parameters like Modified Mallampatti Class, Inter Incisor distance, Thyromental distance, Intubation difficulty scale are assessed.

Then you will be taken inside the operating theatre and routine medications (anxiolytic, antisecretory and pain killers) will be given.

Then you will be given hypnotic and muscle relaxant. Your trachea will be intubated with a endotracheal tube and artificial ventilation will be given and surgery will proceed. At the end of surgery, you will be awakened and endotracheal tube will be removed. You will have no pain and no memory of surgery.

Signature of investigator: Signature of participant :

Date :

PATIENT CONSENT FORM

Study Title: A prospective study to evaluate the incidence of difficult endotracheal intubation in thyroid surgery.

Study Centre: Institute of Anaesthesiology and critical care, Rajiv Gandhi Government General Hospital, Chennai.

Participant name: Age: Sex:

I.P.No.:

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the pitfalls in the procedure. I have been explained about the safety, advantage and disadvantage of the technique.

I understand that my participation in the study is voluntary and that i am

free to withdraw at any time without giving any reason.

I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both

in respect to current study and any further research that may be conducted in relation to it, even if i withdraw from the study.

I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law.I agree not to restrict the use of any data or results that arise from the study.

Name :

Time :

Signature/thumb impression of patient

Date :

Place:

Signature of the investigator :

Name of the investigator : G.Arthi

PROFORMA

Date :Roll no :Airway device :

Name :

Age :Sex :Ip no :

Diagnosis :

Surgical procedure done :

Ht :Cvs :

Wt :Rs :

Airway : MMC -IID -Dentition –

Pre op assessment :

History : Any co-morbid illness

H/O Documented difficult airway

H/O previous surgeries

Measures of study outcome :

Premedication :

Induction :

Intubation :

Intubation difficulty :

Intubation duration :

Statistical analysis of predictive factors of difficult intubation

Body mass index

Sex

Interincisor gap

Mallampatti Grade

Neck mobility

Thyromental distance

Retrognathia

Diagnosis

Tracheal deviation

Compression signs

Loose tooth/dentures

INTUBATION DIFFICULTY SCORING

N1 (no of addl attempts)-

N2(no of additional operators)-

N3(no of alternative intubation techniques)-

N4(laryngoscopic view- CL grade)-

N5 (lifting force applied during laryngoscopy)-

N6(need to apply ext laryngeal pressure)-

N7 (position of vocal cords at intubation)-

IDS-

Duration :

Airway Trauma:

ஆராய்ச்சி ஒப்புதல் படிவம்

ஆராயச்சியின் தலைப்பு

தைராய்டு சுரப்பி அறுவை சிகிச்சைக்கு முழு மயக்கம் கொடுத்த பின்பு கழுத்தின் இருபுறமும் மேலோட்டமான மற்றும் உள் நரம்பு பின்னல் பகுதியில் ரோபிவேகெய்ன் (அ) ரோபிவெகெய்ன் மற்றும் குளோனிடின் மருந்து கலவை செலுத்தி மரத்துப்போகும் தன்மை அடிப்படையில் ஒப்பிடுதல்

ஆய்வு நிலையம் : மயக்கவியல் துறை, சென்னை மருத்துவக் கல்லூரி சென்னை – 3.

பங்கு பெறுவரின் பெயர் :

பங்குபெறுபவரின் எண் :

பங்குபெறுபவர் இதனை (✓) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக்கொள்ளவும் அதை பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கின்றேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன் இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன். ☐

பங்கேற்பவரின் கையொப்பம் ..... இடம்..... தேதி.....

கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம்..... தேதி.....

ஆய்வாளரின் பெயர் .....

Master Chart

S. No	AGE	GENDER	BMI	TMD	IID	MMS	Neck Mobility	RETROGNATHIA	DIAG NOSIS	SURGERY	TRACHEAL DEVIATION	COMPRESSION	IDS Score
1	38	F	18.31	8	3.5	3	NL	NIL	SNT	TT	NIL	NIL	0
2	32	M	18.51	8.5	4	3	NL	NIL	TOXIC GOITRETT	TT	NIL	NIL	2
3	36	F	25.4	8	4	2	NL	NIL	MNG	TT	NIL	NIL	2
4	50	F	19.5	7	5	1	NL	NIL	SNT	TT	NIL	NIL	2
5	45	F	22	7	4	3	NL	NIL	TOXIC MNG	TT	NIL	NIL	2
6	27	F	27.18	7	4	2	NL	NIL	SNT	TT	NIL	NIL	0
7	55	F	22.21	7	4	1	MR	NIL	PAP CA	TT	TO RIGHT	NIL	0
8	50	F	25.9	7	3.5	2	MR	NIL	FOLL CA	TT	NIL	NIL	2
9	50	F	18.9	7	4	3	NL	NIL	PAP CA	TT	TO RIGHT	NIL	0
10	18	F	20.76	8	5	1	NL	NIL	MNG	TT	NIL	NIL	0
11	38	F	26.2	7.5	4	3	NL	NIL	SNT	TT	NIL	NIL	0
12	60	F	16.39	6.5	5	2	MR	NIL	MNG	TT	NIL	NIL	2
13	40	F	20	7	3.5	3	NL	NIL	MNG	TT	NIL	NIL	0
14	34	F	22.5	7.5	3.5	1	NL	NIL	MNG	TT	NIL	NIL	0
15	39	F	26.49	6	5	1	NL	NIL	MNG	TT	NIL	NIL	0
16	36	F	20.8	6	4	II	MR	NIL	TOXIC MNG	TT	NIL	NIL	0
17	40	F	21.3	6.5	5	1	NL	NIL	MNG	TT	NIL	NIL	2
18	21	F	20.2	7	5	1	NL	NIL	MNG	TT	NIL	NIL	0
19	47	F	26	7	3.5	2	NL	NIL	MNG	TT	NIL	NIL	2
20	43	F	22.2	7.5	4	2	NL	NIL	MNG	TT	NIL	NIL	0
21	35	F	25.7	7	5	1	NL	NIL	MNG	TT	NIL	NIL	2

S. No	AGE	GENDER	BMI	TMD	IID	MMS	Neck Mobility	RETROGNATHIA	DIAG NOSIS	SURGERY	TRACHEAL DEVIATION	COMPRESSION	IDS Score
22	35	F	25.2	6.5	3.5	3	NL	NIL	MNG	TT	NIL	NIL	2
23	48	F	30.5	7.5	4	3	NL	NIL	SNT	TT	NIL	NIL	0
24	29	F	21.7	8	4	1	NL	NIL	SNT	TT	NIL	NIL	0
25	27	F	21.3	7.5	3	3	SR	NIL	MNG	TT	NIL	NIL	0
26	48	F	26.9	7	3.5	3	NL	NIL	SNT	TT	NIL	NIL	0
27	40	F	24.6	7	4	2	NL	NIL	MNG	TT	NIL	NIL	0
28	51	F	27.5	6.5	4	2	MR	PRESENT	TOXIC MNG	TT	NIL	NIL	2
29	44	F	24.2	7.5	4	2	NL	NIL	TOXIC MNG	TT	NIL	NIL	0
30	43	F	22.3	7	5	1	NL	NIL	SNT	TT	NIL	NIL	0
31	34	F	21.2	7.5	4	II	NL	NIL	MNG	TT	NIL	NIL	0
32	26	M	25	8	4	1	NL	NIL	MNG	TT	NIL	NIL	0
33	23	F	22	7	3.5	2	NL	NIL	SNT	TT	NIL	NIL	2
34	30	F	21	6.5	4	2	NL	NIL	MNG	TT	NIL	NIL	2
35	60	F		6.5	3.5	3	MR	NIL	MED CA THY	TT	NIL	PRESENT	3
36	45	F	24.7	6	3.5	3	NL	NIL	MNG	TT	NIL	NIL	2
37	46	F	25	7	4	2	SR	NIL	MNG	TT	NIL	NIL	0
38	43	F	22	6	3.5	2	NL	NIL	SNT	TT	NIL	NIL	0
39	46	M	28	8	4.5	2	NL	NIL	PAP CA	TT	NIL	PRESENT	0
40	60	F	21.6	6	3.5	3	NL	NIL	PAP CA	TT	TO RIGHT	NIL	3
41	37	F	24.6	7	3.5	2	NL	NIL	MNG	TT	NIL	NIL	0
42	34	F	27.8	6.5	3.5	2	NL	NIL	MNG	TT	NIL	NIL	0
43	36	M	30.8	8	4.5	1	NL	NIL	MNG	TT	NIL	NIL	2
44	54	F	24	7	4	2	NL	NIL	MNG	TT	NIL	NIL	0

S. No	AGE	GENDER	BMI	TMD	IID	MMS	Neck Mobility	RETROGNATHIA	DIAG NOSIS	SURGERY	TRACHEAL DEVIATION	COMPRESSION	IDS Score
45	60	F	25.5	6	3.5	3	NL	NIL	MNG	TT	NIL	NIL	0
46	35	F	24.8	6.5	4	1	NL	NIL	MNG	TT	NIL	NIL	0
47	36	F	23.8	6.5	4	1	MR	NIL	MNGWITH RETRO	TT	NIL	NIL	2
48	34	F	22.5	7	4	2	NL	NIL	MNG	TT	NIL	NIL	2
49	45	F	26.5	7	3.5	3	NL	NIL	MNG	TT	NIL	NIL	2
50	30	F	19.1	7	4	1	NL	NIL	TOXIC MNG	TT	NIL	NIL	0
51	40	F	23.9	7	4.5	2	NL	NIL	MNG	TT	NIL	NIL	2
52	36	F	19.1	7	4	1	NL	NIL	SNT	TT	NIL	NIL	0
53	32	F	28.6	6.5	4	1	NL	NIL	GOITRES DISEASE	TT	NIL	NIL	0
54	50	F	19.4	6.5	4	2	NL	NIL	MNG	TT	NIL	NIL	2
55	45	F	21.2	6.5	4	2	NL	NIL	PAP CA	TT	NIL	NIL	2
56	33	F	20.3	7	3.5	2	NL	NIL	MNG	TT	NIL	NIL	0
57	27	F	22.6	7	4	1	NL	NIL	MNG	TT	NIL	NIL	0
58	24	F	21.9	7.5	4	1	NL	NIL	MNG	TT	NIL	NIL	0
59	25	F	22.8	6.5	3.5	2	NL	NIL	MNG	TT	NIL	NIL	0
60	40	M	21.5	7.5	4	2	NL	NIL	PAP CA	TT	NIL	NIL	2
61	25	F	22.6	6.5	3.5	2	NL	NIL	MNG	TT	NIL	NIL	0
62	35	F	26	6.5	3.5	3	NL	NIL	TOXIC MNG	TT	NIL	NIL	0
63	37	F	25.8	8	4.5	2	NL	NIL	SNT	TT	NIL	NIL	0
64	48	F	30.6	7.5	4	1	NL	NIL	SNT	TT	NIL	NIL	2
65	26	F	22.4	7	4	2	NL	NIL	GRAVES DIS	TT	NIL	NIL	2
66	33	F	25.4	8	4.5	2	NL	NIL	TOXIC MNG	TT	NIL	NIL	2

S. No	AGE	GENDER	BMI	TMD	IID	MMS	Neck Mobility	RETROGNATHIA	DIAG NOSIS	SURGERY	TRACHEAL DEVIATION	COMPRESSION	IDS Score
67	21	M	24.9	8.5	5.5	1	NL	NIL	SNT	TT	NIL	NIL	0
68	47	F	22.8	7	4	3	NL	NIL	PAP CA	TT	NIL	PRESENT	2
69	40	F	27.8	7	4	2	NL	NIL	MNG	TT	NIL	NIL	2
70	29	F	21.9	7	3.5	2	NL	NIL	PAP CA	TT	TO LEFT	NIL	0
71	40	F	27.8	7	4	2	NL	NIL	MNG	TT	NIL	NIL	0
72	41	F	26	6.5	3	3	NL	NIL	MNG	TT	NIL	NIL	0
73	48	F	27.4	6.5	3.5	2	NL	NIL	SNT	TT	NIL	NIL	0
74	44	M	26.6	8	6	1	NL	NIL	MNG	TT	NIL	NIL	0
75	24	F	23.7	7	4	1	NL	NIL	MNG	TT	NIL	NIL	0
76	46	F	22.6	6.5	3.5	2	NL	NIL	SNT	TT	NIL	NIL	0
77	38	F	27.6	6.5	4	2	NL	NIL	SNT	TT	NIL	NIL	0
78	29	F	21.3	7	3.5	1	NL	NIL	PAP CA	TT	NIL	NIL	0
79	40	F	28.2	7	3.5	2	NL	NIL	TOXIC MNG	TT	NIL	NIL	0
80	59	F	26	7	3.5	3	MR	NIL	FOLL CA	TT	NIL	NIL	2
81	46	F	27.6	6.5	3.5	2	NL	NIL	TOXIC MNG	TT	NIL	NIL	0
82	45	F	24	6.5	4	1	NL	NIL	MNG	TT	NIL	NIL	0
83	55	F	26.2	7.5	4	1	NL	NIL	MNG	TT	NIL	NIL	0
84	38	F	23.5	7	3.5	3	NL	NIL	SNT	TT	NIL	NIL	0
85	43	M	24	7	3	2	NL	NIL	SNT	TT	NIL	NIL	0
86	35	F	22.6	8	3.5	2	NL	NIL	SNT	TT	NIL	NIL	2
87	50	M	23.8	7.5	4	2	NL	NIL	SNT	TT	NIL	NIL	2
88	40	F	30.6	6.5	3.5	2	NL	NIL	MNG	TT	NIL	NIL	3
89	32	F	23.2	6	3	2	NL	NIL	MNG	TT	NIL	NIL	2

S. No	AGE	GENDER	BMI	TMD	IID	MMS	Neck Mobility	RETROGNATHIA	DIAG NOSIS	SURGERY	TRACHEAL DEVIATION	COMPRESSION	IDS Score
90	39	F	25.2	7	3	2	NL	NIL	MNG	TT	NIL	NIL	0
91	40	F	24.8	6.5	3.5	2	NL	NIL	TOXICMNG	TT	NIL	NIL	2
92	23	F	23.2	6	3	2	NL	NIL	SNT	TT	NIL	NIL	0
93	45	F	26.2	6.5	3.5	1	NL	NIL	MNG	TT	NIL	NIL	0
94	56	F	23.4	7	3.6	3	NL	NIL	MNG	TT	NIL	NIL	2
95	26	F	22	8	4	2	NL	NIL	MNG	TT	NIL	NIL	0
96	42	F	21.6	7.5	4.5	3	NL	NIL	SNT	TT	NIL	NIL	0
97	29	F	32.4	7	3.5	1	NL	NIL	MNG	TT	NIL	NIL	0
98	45	F	24.8	7	3.5	2	NL	NIL	SNG	TT	NIL	NIL	2
99	34	M	27.6	8	5.5	1	NL	NIL	TOXIC MNG	TT	NIL	NIL	2
100	40	F	24.2	8	3.5	2	NL	NIL	SNT	TT	NIL	NIL	0

Intubation Difficulty Score, Duration and Trauma during Intubation

NO	C L	INTUBATION DIFFICULTY SCALE								DURATION	TRAUMA
		N1	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**SCORE**	**SEC**	
1	1	0	0	0	0	0	0	0	0	14	_
2	2A	0	0	0	1	1	1	0	3	16	_
3	2A	0	0	0	1	0	1	0	2	16	_
4	2B	0	0	0	1	1	1	0	3	16	_
5	2A	0	0	0	1	1	1	0	3	14	_
6	1	0	0	0	0	0	0	0	0	14	_
7	1	0	0	0	0	0	0	0	0	14	_
8	2B	0	0	0	1	1	0	0	2	16	_
9	1	0	0	0	0	0	0	0	0	13	_
10	1	0	0	0	0	0	0	0	0	12	_
11	1	0	0	0	0	0	0	0	0	14	present
12	2B	0	0	0	1	0	0	0	1	14	_
13	1	0	0	0	0	0	0	0	0	14	_
14	1	0	0	0	0	0	0	0	0	16	_
15	1	0	0	0	0	0	0	0	0	13	_
16	1	0	0	0	0	0	0	0	0	13	_
17	2A	0	0	0	1	0	1	0	2	12	_
18	1	0	0	0	0	0	0	0	0	14	_
19	2B	0	0	0	1	0	0	0	1	14	_
20	2A	0	0	0	1	0	0	0	1	16	_
21	2B	0	0	0	1	0	0	0	1	14	_
22	2B	0	0	0	1	0	0	0	1	14	present

NO	C L	INTUBATION DIFFICULTY SCALE								DURATION	TRAUMA
23	1	0	0	0	0	0	0	0	0	14	_
24	1	0	0	0	0	0	0	0	0	13	_
25	2A	0	0	0	1	0	0	0	1	12	_
26	1	0	0	0	0	0	0	0	0	16	_
27	1	0	0	0	0	0	0	0	0	14	_
28	1	0	0	0	0	0	0	0	0	12	_
29	1	0	0	0	0	0	0	0	0	12	_
30	1	0	0	0	0	0	0	0	0	12	_
31	1	0	0	0	0	0	0	0	0	14	_
32	1	0	0	0	0	0	0	0	0	14	_
33	2A	0	0	0	1	0	0	0	1	14	_
34	2B	0	0	0	1	0	0	0	1	14	_
35	3A	1	0	1	2	1	1	0	6	22	_
36	2A	0	0	0	1	0	1	0	2	14	_
37	1	0	0	0	0	0	0	0	0	19	_
38	1	0	0	0	0	0	0	0	0	19	_
39	1	0	0	0	0	0	0	0	0	14	_
40	3A	1	0	1	2	1	1	0	6	21	_
41	1	0	0	0	0	0	0	0	0	16	_
42	1	0	0	0	0	0	0	0	0	17	_
43	2B	0	0	0	1	0	0	0	1	16	_
44	1	0	0	0	0	0	0	0	0	14	_
45	1	0	0	0	0	0	0	0	0	16	_
46	1	0	0	0	0	0	0	0	0	16	_
47	3A	0	0	0	2	0	1	0	3	14	present

NO	C L	INTUBATION DIFFICULTY SCALE								DURATION	TRAUMA
48	2B	0	0	0	1	0	0	0	1	20	_
49	2A	0	0	0	1	0	1	0	2	16	_
50	1	0	0	0	0	0	0	0	0	14	_
51	2A	0	0	0	1	0	0	0	1	16	_
52	1	0	0	0	0	0	0	0	0	16	_
53	1	0	0	0	0	0	0	0	0	14	_
54	2A	0	0	0	1	0	0	0	1	17	_
55	2B	0	0	0	1	0	0	0	1	20	_
56	1	0	0	0	0	0	0	0	0	18	_
57	1	0	0	0	0	0	0	0	0	14	_
58	1	0	0	0	0	0	0	0	0	14	_
59	1	0	0	0	0	0	0	0	0	14	_
60	2A	1	0	0	1	0	0	0	2	18	_
61	1	0	0	0	0	0	0	0	0	14	_
62	1	0	0	0	0	0	0	0	0	16	_
63	1	0	0	0	0	0	0	0	0	14	_
64	2B	0	0	0	1	0	0	0	1	16	_
65	2A	0	0	0	1	0	1	0	2	16	_
66	2B	0	0	0	1	0	0	0	1	16	_
67	1	0	0	0	0	0	0	0	0	14	_
68	2A	0	0	0	1	0	1	0	2	14	_
69	2B	0	0	0	1	0	0	0	1	16	_
70	1	0	0	0	0	0	0	0	0	16	_
71	1	0	0	0	0	0	0	0	0	14	_
72	1	0	0	0	0	0	0	0	0	14	_

NO	C L	INTUBATION DIFFICULTY SCALE								DURATION	TRAUMA
73	1	0	0	0	0	0	0	0	0	19	_
74	1	0	0	0	0	0	0	0	0	16	_
75	1	0	0	0	0	0	0	0	0	18	_
76	1	0	0	0	0	0	0	0	0	14	_
77	1	0	0	0	0	0	0	0	0	20	_
78	1	0	0	0	0	0	0	0	0	16	_
79	1	0	0	0	0	0	0	0	0	16	_
80	2A	0	0	0	1	0	0	0	1	16	PRESENT
81	1	0	0	0	0	0	0	0	0	14	_
82	1	0	0	0	0	0	0	0	0	14	_
83	2B	0	0	0	1	0	0	0	1	16	_
84	2B	0	0	0	1	0	0	0	1	18	_
85	1	0	0	0	0	0	0	0	0	14	_
86	2B	0	0	0	1	0	1	0	2	16	_
87	2B	0	0	0	1	0	1	0	2	16	_
88	3A	0	1	1	2	1	1	0	6	14	_
89	2A	0	0	0	1	0	1	0	2	16	_
90	1	0	0	0	0	0	0	0	0	16	_
91	2A	0	0	0	1	0	0	0	1	14	_
92	1	0	0	0	0	0	0	0	0	18	_
93	1	0	0	0	0	0	0	0	0	16	_
94	2B	0	0	0	1	0	0	0	1	14	_
95	1	0	0	0	0	0	0	0	0	14	_
96	1	0	0	0	0	0	0	0	0	16	-
97	1	0	0	0	0	0	0	0	0	16	_

NO	C L	INTUBATION DIFFICULTY SCALE								DURATION	TRAUMA
98	2A	0	0	0	1	0	0	0	1	16	_
99	2A	0	0	0	1	0	0	0	1	16	_
100	1	0	0	0	0	0	0	0	0	14	_